PUBLISHED **Product Engineering** MONTHLY

McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N. Y.

INDEX TO VOLUME XXIII

JANUARY to DECEMBER 1952

EDITORIALS

Standards of worth....Jan. 119
How to help Britain..and ourselves....Jan. 232A
You can't do something for nothing..Feb. 117
Colleges and political domination..Mar. 117
Pointing the way to continuing prosperity....Mar. 230A
Putting the lid on supply and demand....Apr. 121
Where you will find the real revolution....Apr. 274
Supply and demand can do it better....May 117
Some things are worse than strikes....May 258A
We love to be fooled....June 117
Formulas and stress analysis....July 117
Handouts cost plenty....Aug. 117
Every engineer can help....Sept. 117
More power for sudden death....Oct. 119
ABC statement....Oct. 197
Santa Claus could die of old age..Oct. 264A
The will to win....Nov. 119
How prosperous is the USA?....Nov. 180A
Who is to blame?....Dec. 127

SPECIAL SECTIONS

Phosphate coatings for military products....Feb. 183
Military specifications covering phosphate coatings (gatefold)....Feb. 190A
Objectives in industrial design....Apr. 171
Engineering your company's future..May 151
Finishes for plastics....June 167
Some newer organic protective coatings....Aug. 167
High speed photography in design..Sept. 167
Camera systems, chart of high-speed (gatefold)....Sept. 182A
Correction....Nov. 294
Strain gage transducers for measurement and control....Nov. 121

—A—

Abrasive makes accurate cuts, high speed....Sept. 201
A-c motor performance, effects of rotor design on....July 124
Accumulators, improve circuit performance with hydraulic....Oct. 192
Acoustic materials, reducing product noise with....Sept. 162
Active rudder turns ship on its own axis....Oct. 308
Adhesives, engineering uses for rubber....Feb. 130
Adhesives, properties of some heat-resistant (abstract)....July 236
Adhesives replace rivets, heat resistant....Feb. 200
Adjustable frequency multi-motor drives....May 146
Adjustable speed characteristics of d-c motors....Mar. 180
Adjustable transformer motor speed controls....Jan. 178
Aerosol paint units future for....Apr. 198
Air conditioner....Aug. 146
Air compressor, Kidde....Apr. 140
Air replaces springs in new bus suspension....Dec. 199
Air turbine driven spindles for internal grinding machines....Mar. 160
Aircraft design....Sept. 113
Aircraft Industries Association....Nov. 115
Aircraft production....Aug. 186
Aldip process coats ferrous metals with aluminum....Aug. 193
Alignment chart for face gears....July 189
Allowable design loads for aluminum columns....Aug. 197
Alloys for high temperature use, leaner (abstract)....May 282
Altimeter with stationary diaphragm....July 146
Aluminum alloy sheet, strength properties of welds in 61S-T6....June 148
Aluminum alloys, fatigue properties of cast....May 119
Aluminum alloys, flux bath dip brazing of....Feb. 173
Aluminum alloys, hot forming....July 163
Aluminum and magnesium assemblies, spotwelding highly stressed....Mar. 185
Aluminum and nickel....Mar. 113
Aluminum bonding, applications extended for....Dec. 134
Aluminum columns, allowable design loads for....Aug. 197
Aluminum, designers find new ways to use....Sept. 197
Aluminum, heat-resisting sintered (abstract)....Apr. 270
Aluminum, lightweight engine of die cast....Mar. 144
Aluminum parts cut weight of marine diesel....Dec. 144
Aluminum, process plates at room temperature....July 180
Amplifiers, thirteen ways to use magnetic....Sept. 141
Aluminum welding (abstract)....July 254
Amplifiers, power and voltage....Aug. 178
Amplifiers, voltage....July 158
An open door policy for inventors..Dec. 129
Analysis of a shaker motion for a conveyor application....Apr. 134
Analysis of a symmetrical five-bar linkage....Jan. 175
Reference book sheet....Jan. 201
Applications extended for aluminum bonding....Dec. 134
Armed forces personnel requirements may cause employment problem....Mar. 190
Assembly and locking....Aug. 162
ASTIA....May 113
Atlantic pump-motor unit....May 133
Atomic waste will lower cost of radiography....July 185
Automatic check signer....Oct. 162
Automatic core maker....Mar. 192
Automatic core maker pneumatically powered....July 140
Automobile die, thermosetting plastic replaces steel in....Oct. 202
Automobile engine firing, how carbon deposits affect....Mar. 197
Automobiles, 1952....Feb. 144
Willys....Feb. 144
Buick....Feb. 148
Lincoln....Feb. 152
Ford....Feb. 156
Mercury....Feb. 160
Packard....Feb. 164
Automobiles, Chrysler K310 experimental dream car....Jan. 195
Automobiles, Ford reveals styles of the future in car designs....Mar. 196
Automobiles, several foreign....Mar. 150
Axial thrust bearings, swaged housing ring grooves to retain....Nov. 149

—B—

Backlash in threaded parts, how to provide for....Sept. 154
Ball bearings, eleven ways to oil lubricate....Feb. 166
Ball bearing vibration, cutting....Apr. 286
Ball bearings, nylon parts for....Feb. 119
Band tool, DoAll....Apr. 146
Bar slides for machines, round....Dec. 162
Basic design for small part stampings....Jan. 162
Bearing cartridge for freight cars, interchangeable....Mar. 152
Bearing lubrication problems, gas turbine (abstract)....Feb. 250
Bearing materials, sensitivity of, to abrasive dirt in oil supply....Dec. 155
Bearings analyzed, oil flow in plain journal....Apr. 210
Bearings, selecting needle....Apr. 123
Bearings, swaged housing ring grooves to retain axial thrust....Nov. 149
Beater saturated gasketing materials....June 164
Bellows, ways to use metallic....June 162
Bending roll design analysis....Jan. 133
Bendix accelerometer....Mar. 152
Benzidine marks high sensitivity recording paper....Dec. 196
Better ways of evaluating properties of plastics....Mar. 130
Bevel gear drives, reaction forces on....Mar. 199
Bevel gears, stress chart for spur and....Nov. 203
Bimetal yoke trips miniature circuit breaker....Dec. 142
BIR cracks down on non-profit research institutes....Nov. 201
Blade sharpener, worm drive used on....Jan. 152
Blanchard vertical grinder....July 136
Bonded joints in the construction of metal aircraft (abstract)....Oct. 276
Bonding, applications extended for aluminum....Dec. 134
Brakes and clutches, modern control circuits for electric....Feb. 138
Brakes for a-c motors, d-c....Sept. 156

Brakes, selecting motor mounted magnetic ..... July 119
correction ..... Oct. 290
Brazing and soldering, induction (abstract) ..... Sept. 254
Brazing of aluminum alloys, flux bath dip ..... Feb. 173
Brittleness of steel, effects of nitrogen on low-temperature ..... Apr. 204
Bronze, nickel-aluminum (abstract) Mar. 248
Buick, 1952 ..... Feb. 149
Business outlook: what's ahead for 1953 ..... Dec. 198

—C—

Calculator, miniature ..... Oct. 160
Calculator, Starret ..... Aug. 140
Calibration table for vibration type transducer, sinusoidal ..... Dec. 172
Calidyne shaker table ..... June 140
Camera, Ansco Karomat ..... Nov. 166
Camera photographs identifying data, oscilloscope ..... Dec. 142
Camera, spherical shell ..... Dec. 200
Camera systems, chart of high speed (gatefold) ..... Sept. 182A
Correction ..... Nov. 294
Capacitive load chamber, hydraulic noise reduction by ..... Mar. 135
Carborundum abrasive peels vegetables ..... Mar. 148
Cast aluminum alloys, fatigue properties of ..... May 119
Casting porosity rejects, impregnation cuts ..... Feb. 193
Castings and forgings, designing magnesium (abstract) ..... Dec. 263
Cast iron, internal stresses in (abstract) ..... Oct. 266
Cast iron, welding nodular ..... Dec. 174
Cathode ray tubes for voltage wave form analysis ..... Oct. 190
Centrifuge studies human tolerance to acceleration ..... Aug. 188
Ceramic coatings, more about ..... Oct. 134
Ceramic coatings reach volume reduction stage ..... Jan. 199
Ceramic permanent magnet replaces metal with oxides ..... Mar. 197
Ceramic thickness gage permits accurate determinations ..... May 230
Ceramic transmitting tubes, GE predicts wider use ..... Apr. 209
Chains, elastic elongation of ..... Feb. 176
Check signer ..... Oct. 162
Chromate protective coatings ..... Sept. 127
Chromium stainless steels, properties of ..... Jan. 117
Chrysler K310 experimental dream car ..... Jan. 195
Circuit breaker, miniature ..... Dec. 142
Circuit measures vibration decay constant ..... Dec. 148
Clothes dryer, Hotpoint ..... Apr. 142
Clutches, modern control circuits for electric brakes and ..... Feb. 138
Coal-burning locomotive gas turbine ..... May 228
Coal locomotive, GE ..... Apr. 150
Coatings, chromate protective ..... Sept. 127
Coatings for ferrous parts, hard chromium ..... Aug. 164
Coatings for military products, phosphate ..... Feb. 183
Coatings, more about ceramic ..... Oct. 134
Coatings, neoprene protective ..... Aug. 138
Coatings, some newer organic protective ..... Aug. 167
Coatings, Teflon ..... Sept. 149
Combination lock, clickless ..... Apr. 148
Composite metals: a new key to design flexibility ..... Nov. 153
Composites for mechanical and electrical parts, metal-carbon ..... Nov. 173
Compression springs, design charts for large ..... Feb. 203
Comment ..... July 262
Computer center in the engineering department, organizing a ..... Jan. 137
Comment ..... Apr. 286
Comment ..... June 264
Comment ..... Sept. 274
Computer into robot, sensing device turns ..... Apr. 191
Computer, NBS develops tape memory for ..... Jan. 199
Computers to solve defense problems ..... Sept. 198
Computing device for solving algebraic equations, resistance wire ..... Feb. 134
Cones and pyramids, nomograph for the volume of ..... Nov. 207
Connectors, multi-contact electrical ..... Nov. 184
Contacting engineering graduates for employment ..... May 206
Control actuator, twin-action piston in hydraulic ..... Dec. 148
Control device, torque motor as a ..... Aug. 119
Control rods, structural analysis of ..... Oct. 173
Control, strain gage transducers for measurement and ..... Nov. 121
Controllers, direct-current relays and devices for industrial motor ..... Dec. 167
Converting decimal fractions to actual gear ratios ..... Aug. 158
Correction ..... Oct. 290
Copper alloys in die castings, how to use (abstract) ..... June 246
Copper for high temperature service, stainless, clad ..... Apr. 129
Corrosion factors in design and lubrication ..... Oct. 142
Corrosion protection, new developments ..... June 189
Couplings for motor-generator sets, removable keyless ..... June 123
Couplings for small diameter shafts, low cost ..... May 306
Critical look at fatigue equations ..... July 150
Critical speeds of end supported, bare shafts ..... July 193
Current limiting circuit (abstract) ..... Apr. 274
Liquid level indicators and controllers ..... Mar. 140
Controls, adjustable transformer motor speed ..... Jan. 178
Copper and aluminum ..... Feb. 113
Copper creep investigations, NBS reports on ..... Feb. 201
Correlating the philosophy and practices of research ..... May 174
Coupling small diameter shafts, low costs methods of ..... Jan. 184
Crane brake, mechanically operated switch sets ..... Jan. 145
Creep measuring and recording system, an improved ..... Jan. 172
Cubic equation by a simplified procedure, solution of the ..... Sept. 183
Current trends in fixed resistors ..... Mar. 124
Current trends in potentiometers ..... Oct. 166
Curved holes, new drilling technique produces ..... Jan. 198

—D—

D-c brakes for a-c motors ..... Sept. 156
D-c motors, adjustable speed characteristics of ..... Mar. 180
Decimal system, complaint against ..... June 264
Comment ..... Sept. 274
Design data for metal wire stitching ..... Apr. 156
Design defects cause many air force accidents ..... Mar. 194
Design of coupled overhung shafts ..... Mar. 175
Design versus development ..... May 178
Designing for less friction ..... May 124
Designing springs for precision measurement ..... Apr. 152
Determining rotor inertias by the pendulum method ..... May 233
Die casting design (abstract) ..... Nov. 258
Die castings, hard chromium plate and bright plating of steel or (abstract) ..... Aug. 254
Die castings, how to use copper alloys in (abstract) ..... June 246
Die, thermosetting plastic replaces steel in auto ..... Oct. 202
Diesel engine cooled by forced air ..... Jan. 150
Correction ..... Apr. 292
Differential analyzer, operation and application of the ..... Apr. 164
Correction ..... July 272
Comment ..... Sept. 274
Differential drive uses no gears ..... July 144
Dilastrain method speeds research ..... Jan. 193
Direct-current relays and devices for industrial motor controllers ..... Dec. 167
Dividing head has direct reading scales ..... July 139
DoAll band tool ..... Apr. 146
Double drive motor powers electric torpedo ..... June 146
Drafting efficiency, templates of detail profiles promote ..... Nov. 178
Drafting man-hours, reducing with printed acetate drawings ..... July 134
Drawings, reducing drafting man-hours with printed acetate ..... July 134
Drawings, streamlining production ..... Sept. 161
Drawings, templets + photography = low cost ..... May 186
Drill, Magna ..... June 136
Drill press accessory makes uniform springs ..... Aug. 143
Drilling technique produces curved holes ..... Jan. 198
Drive gear, tooth tread tire, serves as ..... Mar. 150
Driven filler rod propels new welding torch ..... Feb. 200
Dry coloring—a revolution in plastics ..... Mar. 195
Ductile cast iron, NBS reports new data on ..... May 230
Duplicator reproduces with heat, Thermo-Fax ..... Nov. 162

—E—

Edison voicewriter ..... Nov. 158
Effects of resilient foundations on vibration isolation ..... Nov. 170
Effects of rotor design on a-c motor performance ..... July 124
Elastic elongation of chains ..... Feb. 176
Elastic rubber cushion springs for torque load applications ..... Mar. 119
Electric brakes and clutches, modern control circuits for ..... Feb. 138
Electric heating elements ..... Oct. 205
Electrical connectors, multi-contact ..... Nov. 184
Electrical instruments, ruggedized ..... Dec. 146
Electrical jack plug ..... May 136
Electro-machining method (abstract) ..... Sept. 260
Electronic circuits—voltage amplifiers ..... July 158
Power and voltage amplifiers ..... Aug. 178
Using cathode Ray tubes for voltage
Using cathode ray tubes for voltage
Electronic drives compare, how adjustable speed ..... Nov. 189
Electronic ferrite applications (abstract) ..... May 288
Electronic flip-flop as a machine element ..... Feb. 124
Electronic units ..... Feb. 115
Electronic simulator teaches air crews to fly on the ground ..... Apr. 205
Electronic tubes, how to detect failing ..... Dec. 194
Eleven ways to oil lubricate ball bearings ..... Feb. 166
Engine firing, how carbon deposits affect automobile ..... Mar. 197
Engine piston drives road breaker tool ..... Dec. 138
Engineer supply shorter in 1952 ..... Mar. 190
Engineering department procedure in design of reproduction models ..... Jan. 157
Engineering foresight that aids production ..... May 196
Engineering graduates for employment, contacting ..... May 206
Engineering management ..... May 152
Engineering manpower problem, what must be done to solve the ..... May 210
Engineering potential of polyethylene ..... July 168
Engineering reports are vital to good management ..... May 220
Engineering shortage, Lockheed moves to ease ..... Mar. 190
Engineering uses for rubber adhesives ..... Feb. 130
Engineering your company's future (special section) ..... May 151
Essentials of engineering management ..... May 152
Correlating the philosophy and practices of research ..... May 174
Design versus development ..... May 178
One solution to design bottlenecks: special engineering groups ..... May 182
Templets + photography = low-cost drawings ..... May 186
Control of paperwork in engineering ..... May 191
Engineering foresight that aids production ..... May 196
Matching the job and the man ..... May 198
Financial incentives for engineers ..... May 202
Contacting engineering graduates for employment ..... May 206
What must be done to solve the engineering manpower problem ..... May 210
Training today's engineers ..... May 214
To place graduates properly: try screening tests ..... May 218
Engineering reports are vital to good management ..... May 220
Executive opinion; the key is personnel ..... May 224
Engineers, manpower commission study urges better use ..... Oct. 203
Equivalent dynamical systems for complex vibration problems ..... July 130
Estimating the weights of joints in cylindrical vessels ..... Dec. 213
Executive opinion: personnel ..... May 224
Expanded metal ..... Apr. 199
Exposure meter ..... Jan. 152
Extensometer contacts bolt ends in tensile test ..... Sept. 140
Extruded plastic parts ..... Oct. 150
Eyelet versus screw machine products ..... Nov. 181

—F—

Fabric base phenolic laminate in paper mill ..... May 130
Face gears, alignment chart for ..... July 159
Fan, General Electric household ..... July 144
Fatigue equations, a critical look at ..... July 150
Fatigue failures, torsional ..... Mar. 168
Fatigue properties of cast aluminum alloys ..... May 119
Ferro-alloy steel production, Electro Metallurgical Co. plant ..... Feb. 198
Ferrous parts, hard chromium coatings for ..... Aug. 164
Film for ultra-high speed photography ..... Oct. 206
Financial incentives for engineers ..... May 202
Fine-pitch gear drawing data required to assure quality ..... July 174
Correction ..... Oct. 290
Comments ..... Nov. 278
Finishes for plastics ..... June 167
Finishes, some practical aspects of specifying surface ..... Dec. 150
Fire detection system ..... Sept. 134
Fitting machines to men ..... Mar. 164
Five-bar linkage, analysis of a symmetrical ..... Jan. 175
Reference book sheet ..... Jan. 201
Flame plating applies hard surface ..... Oct. 200
Flip-flop, electronic ..... Feb. 124
Fluid conditioning, hydraulic noise reduction by ..... Apr. 182
Fluid flow losses through orifices ..... May 237

Fluid flow through orifices....Apr. 213
Fluorescent ink spots cracks....Aug. 190
Flux bath dip brazing of aluminum alloys....Feb. 173
Flying laboratory, jet-propelled....Feb. 198
Flying saucer reports, cool weather chills....Oct. 199
Foam plastic adds strength to aircraft structures....Nov. 199
Foam plastics as engineering materials....Apr. 192
Ford goes to valve overhead six cylinder engine....Feb. 156
Ford reveals styles of the future in car designs....Mar. 196
Foreign cars, structural features...Mar. 150
Forgings and extrusions, how to use copper alloys in (abstract)....June 242
Forgings, designing magnesium castings and (abstract)....Dec. 26
Forgings, large....Dec. 123
Friction, designing for less....May 124
Fulcrum balances floatless humidifier....Sept. 138
Fundamental transverse frequencies of tapered cantilever bars....Aug. 175

—G—

Gas turbine bearing lubrication problems (abstract)....Feb. 250
Gas turbine engine materials (abstract)....July 248
Gasketing materials, beater saturated....June 164
GE coal locomotive....Apr. 150
Gear drawing data required to assure quality, fine-pitch....July 174
Correction....Oct. 290
Comments....Nov. 278
Gear drives, reaction forces on bevel....Mar. 199
Gear oil additives, application and function of (abstract)....Jan. 242
Gear ratios, converting decimal fractions to actual....Aug. 158
Correction....Oct. 290
Gear tooth calculations, nomograph to simplify....Sept. 205
Gears for precision instrument drives, optimum selection of....Jan. 166
Comment....Apr. 282
Germanium transitors (abstract)...Dec. 270
Germanium will miniaturize electronic components, GE predicts....Mar. 179
Germany's position in industrial markets, research and development programs rebuild....May 227
Glass balloons, tiny....Dec. 200
Glass paper solves filter and electrical problems....Jan. 195
Glass to metal structures, methods of attaching....July 166
Government research....July 113
Gray-iron castings (abstract)....Apr. 278

—H—

HAE coatings (abstract)....Dec. 278
Hard chromium coatings for ferrous parts....Aug. 164
Hard chromium plate and bright plating of steel or die castings (abstract)....Aug. 254
Hard facing materials to resist impact, heat friction, abrasion....Mar. 154
Hard surface, flame plating applies..Oct. 200
Heat-resistant adhesives, properties of some (abstract)....July 236
Heat-resisting sintered aluminum (abstract)....Apr. 270
Heating elements, designing electric..Oct. 205
Helical springs, streamlining the selection of rectangular....June 155
Helical wire springs, uses....Dec. 160
Helicopter, world's biggest....July 185
High frequency magnet properties..Nov. 197
High pressure jet boosts tool life and cutting speeds....Feb. 197
High-speed camera systems (gatefold) Sept. 182A
Correction....Nov. 297
High speed photography in design..Sept. 167
High temperature reduces pure nickel tensile strength....Sept. 202
High-temperature service, how can we appraise metals for (abstract)..June 250
High temperature service, stainless clad copper for....Apr. 129
High vacuum techniques improve adhesion of evaporated coatings..Oct. 312
Higher current metallic rectifiers...June 119
Hot forming aluminum alloys....July 163
Hotpoint dryer....Apr. 142
Hot pressing powdered metals (abstract)....Aug. 276
Hot windshield clears pilot's view..Jan. 286
How adjustable speed electronic drives compare....Nov. 189
How big a motor....Sept. 142
How to design parts that assemble and lock by twisting....Aug. 162
How to provide for backlash in threaded parts....Sept. 154
How to specify precision knurls....May 142
Hufford straightening press....Aug. 150
Hydraulic accumulators, improve circuit performance with....Oct. 192
Hydraulic control actuator, twin-action piston in....Dec. 148
Hydraulic machines, safety circuits for....Aug. 124
Hydraulic noise reduction by capacitive load chamber....Mar. 135
Hydraulic noise reduction by fluid conditioning....Apr. 182
Hydraulic noise reduction by piston pump modification....Feb. 178
Hydraulic press brakes....Sept. 138
Hydraulic press, world's largest....Feb. 199
Hydraulic steering, Buick....Feb. 149
Hydraulic straightener....Nov. 169
Hydraulic system, multiple pressure..Jan. 186
Hydrodynamic design, significance of separation in....July 152
Hysteresis motor for synchronous power....Dec. 167

—I—

Ice cube maker....May 140
Impregnation cuts casting porosity rejects....Feb. 193
Improve circuit performance with hydraulic accumulators....Oct. 192
Improved creep measuring and recording system....Jan. 172
Increasing tube reliability in industrial circuits....June 175
Induction brazing and soldering (abstract)....Sept. 254
Industrial design, objectives in....Apr. 171
Industry training for co-op engineering students (abstract)....July 244
Instrument drives, optimum selection of gears for precision....Jan. 166
Comment....Apr. 282
Internal combustion engine, pistons act parallel to power shaft in....Mar. 146
Internal stresses in cast iron (abstract) Oct. 266
Inventors, an open door policy for..Dec. 129
Iron, low temperature properties of ingot....Sept. 202
Isolating the noise and vibration of rotating machines....June 151
Isotopes can control automatic processes July 178

—J-K—

Jet starter....May 136
Jet trainer, two-place....Jan. 196
Joints in cylindrical vessels, estimating the weights of....Dec. 213
Journal bearing material, selecting the right....Sept. 119
Key factors in selecting needle bearings....Apr. 123
Keyless couplings for motor-generator sets, removable....June 123
Knurls, how to specify precision....May 142

—L—

Laboratory opened by navy, magnetic ship models....Feb. 194
Lacquer thinners improve auto finishes May 231
Leaner alloys for high temperature use (abstract)....May 282
Lightweight army rifle....Mar. 195
Lightweight car, Willys....Feb. 144
Lightweight engine of die cast aluminum....Mar. 144
Lincoln new from chassis to engine..Feb. 152
Liquid level indicators and controllers Mar. 140
Liquid mixer....Sept. 136
Liquid sensing device with no moving parts....June 124
Locking threaded members....Oct. 148
Logarithmic analysis of servo stability Apr. 186
Low costs methods of coupling small diameter shafts....Jan. 184
Low cost process molds plastic electrical insulators from laminae resin...July 182
Low temperature brittleness of steel effects of nitrogen on....Apr. 204
Low temperature properties of ingot iron....Sept. 202
Low temperature service, selecting metals for....June 158
Lubrication, corrosion factors in design and....Oct. 142
Lubrication problems, gas turbine bearing (abstract)....Feb. 250

—M—

Machinability (abstract)....Nov. 268
Magna drill....June 136
Magnesium assemblies, spot-welding high stressed aluminum and...Mar. 185
Magnesium castings and forgings, designing (abstract)....Dec. 263
Magnetic amplifier uses half-wave circuitry NOT....May 229
Magnetic amplifiers, thirteen ways to use....Sept. 146
Magnetic brakes, selecting motor-mounted....July 119
Correction....Oct. 290
Magnetic robot helmsman to steer navy flattops....Mar. 189
Magnetic ship models laboratory opened by navy....Feb. 194
Magnetic starter responds to refrigeration temperatures....Sept. 140
Magnetically operated disk brake for electric motors....Apr. 148
Manpower problem, engineering....May 210
Marine diesel, aluminum parts cut weight of....Dec. 144
Matching the job and the man....May 198
Materials austerity programs....June 192
Materials availability....May 113
Materials engineering course at Michigan....Mar. 190
Materials expansion....Aug. 192
Materials needed for super-speed airplanes....Oct. 198
Materials, new process will boost copper, nickel and cobalt supplies....July 184
Materials shortages....Apr. 117, Oct. 115
Measurement and control, strain gage transducers for....Nov. 121
Mechanical hands....Jan. 196
Mechanical push-pull, a remote control for industrial use....Aug. 152
Mercury gets major face lifting....Feb. 160
Metal aircraft, bonded joints in the construction of (abstract)....Oct. 276
Metal-carbon composites for mechanical and electrical parts....Nov. 173
Metal sandwich decorates plastic parts Aug. 177
Metal sealant (abstract)....May 295
Metallic rectifiers, higher current...June 119
Metals for high-temperature service, how can we appraise (abstract)..June 250
Metals, wear of (abstract)....Mar. 254
Methods of attaching glass to metal structures....July 166
Mica flakes made into sheet for electrical insulation....Mar. 195
Micro-interferometry for surface measurements....Aug. 156
Military products, phosphate coatings for....Feb. 183
Military specifications covering phosphate coatings (gatefold)....Feb. 190A
Mineral ore-like catalysts improve engine performance....Mar. 191
Miniature calculator....Oct. 160
Miniature circuit breaker....Dec. 142
Mobile working models to train pilots and mechanics, navy uses....June 186
Model billets aid study of material flow, wax filamented....Apr. 158
Models, engineering department procedure in design of preproduction..Jan. 157
Models to train pilots and mechanics, navy uses mobile working....June 186
Modern control circuits for electric brakes and clutches....Feb. 138
Molded jack plug design saves time and metal....Feb. 201
Mollerizing iron and steel....May 231
Molybdenum our most promising refractory metal....Jan. 121
More about ceramic coatings....Oct. 124
Motion pictures of TV produced in one minute....Aug. 144
Motor application to household refrigeration compressor (abstract)....Aug. 268
Motor controllers, direct-current relays and devices for industrial....Dec. 167
Motor drives, adjustable frequency multi-....May 146
Motor, how big a....Sept. 142
Motor for synchronous power, hysteresis....Dec. 167
Motor performance, effects of rotor design on a-c....July 124
Motor protection, overload relays for Aug. 130
Motors, adjustable speed characteristics of d-c....Mar. 180
Motor speed controls, adjustable transformer....Jan. 178
Motors, d-c brakes for a-c....Sept. 156
Motors, plastic blowers for electric..July 147
Mueller piercing machine....June 142
Multi-contact electrical connectors..Nov. 184
Multi-motor drives, adjustable frequency....May 146
Multiple pressure hydraulic system..Jan. 186

—N—

Needle bearings, selecting....Apr. 123
Neoprene protective coatings....Aug. 138
New high impact styrenes....Sept. 194
Nickel-aluminum bronze (abstract) Mar. 248
Nickel tensile strength, high temperature reduces pure....Sept. 202
Nodular cast iron, welding....Dec. 174
Noise and vibration of rotating machines, isolating the....June 151
Noise, reducing product noise with acoustic materials....Sept. 162
Noise reduction by capacitive load chamber, hydraulic....Mar. 135

Noise reduction by fluid conditioning, hydraulic ....Apr. 182
Noise reduction by piston pump modification, hydraulic ....Feb. 178
Nomograph for the volume of cones and pyramids ....Nov. 207
Nomograph to simplify gear tooth calculations ....Sept. 205
Nuclear pile, AEC reveals details of Brookhaven ....Apr. 206
Nuclear reactor, largest research....Apr. 205
Nuclear reactor, low cost....Jan. 192
Nylon heat setting machine....Apr. 144
Nylon parts for ball bearings....Feb. 119
Nylon powder sintered ....Aug. 191

—O—

Objectives in industrial design....Apr. 171
Oil additives, application and function of gear (abstract)....Jan. 242
Oil drilling drawworks....Sept. 130
Oil flow in plain journal bearings analyzed ....Apr. 210
Oil pump ....Mar. 142
Oil supply, sensitivity of bearing materials to abrasive dirt in....Dec. 155
One-coat porcelain enamel finish developed ....Mar. 191
Operation and application of the differential analyzer ....Apr. 164
Correction ....July 272
Comment ....Sept. 274
Optimum selection of gears for precision instrument drives ....Jan. 166
Comment ....Apr. 282
Ordnance corps standards for commercial safety nuts ....Oct. 209
Organic chemical replaces soaps in wide-range temperature greases ....Apr. 210
Organic protective coatings....Aug. 167
Organizing a computer center in the engineering department ....Jan. 137
Comment ....Apr. 286
Comment ....June 264
Comment ....Sept. 274
Orifices, fluid flow losses through...May 237
Orifices, fluid flow through....Apr. 213
Oscilloscope camera photography identifying data ....Dec. 142
Overhung shafts, coupled....Mar. 175
Overload relays for motor protection ....Aug. 130

—P-Q—

Packard cars restyled....Feb. 164
Paint units, big future predicted for aerosol ....Apr. 198
Paper mill, fabric base phenolic laminate used in ....May 130
Paperwork in engineering, control of ....May 191
Patent codification goes into effect, new ....Nov. 200
Patent office cuts application backlog ....Sept. 203
Patent office files as a design source, using ....Feb. 191
Permanent magnets, applications of high strength ....May 140
Personnel requirements may cause employment problem, armed forces ....Mar. 190
Phosphate coatings for military products ....Feb. 183
Photographic imprint saves man-hours ....Sept. 200
Photography in design, high speed..Sept. 167
Piercing machine, Mueller....June 142
Piezo-electric element measures surface roughness ....Oct. 201
Piston and diaphragm pump controlled volume ....Nov. 165
Piston pump modification, hydraulic noise reduction by ....Feb. 178
Pistons act parallel to power shaft in internal combustion engine....Mar. 146
Plane in transcontinental service, fastest ....Mar. 192
Plastic blowers for electric motors..July 147
Plastic body simplifies design of electrical jack plug....May 136
Plastic dies stamp out aircraft parts ....Apr. 211
Plastic electrical insulators from laminac resin, low cost process molds...July 182
Plastic molded motor, first....Jan. 195
Plastic parts, extruded....Oct. 150
Plastic pipe research, SPI sponsors..Oct. 201
Plastic prototypes bridge gap between design and manufacturing....June 182
Plastic replaces steel in auto die, thermosetting ....Oct. 202
Plastic sheath protects cylindrical parts ....July 185
Plastics as engineering materials, foam ....Apr. 192
Plastics availability ....Aug. 113
Plastics, better ways of evaluating properties ....Mar. 180
Plastics, finishes for ....June 167
Plastics in industry today, status of..Oct. 128
Plastigels (abstract) ....Mar. 252
Plastisols, vinyl ....Jan. 154
Plating powder metal parts, problems of (abstract) ....Jan. 246
Platinum electrode replaces diaphragm in loudspeaker ....Mar. 194
Plywood plating tank....Apr. 150
Polyethylene, engineering potential of ....July 168
Porcelain enamel products....Nov. 176
Potentiometers, current trends in...Oct. 166
Powder metal, how it is being made ....Jan. 153
Powder metal parts, problems of plating (abstract) ....Jan. 246
Powder metallurgy in Sweden....Nov. 200
Powdered metals, hot pressing (abstract) ....Aug. 276
Power and voltage amplifiers....Aug. 178
Power lawn mower....Mar. 150
Powerful fatigue tester exerts 500,000 pound force ....Apr. 209
Precision knurls, how to specify....May 142
Press, Wheelon ....June 139
Pressure welds nonferrous metals in cold process ....Nov. 198
Primer on radioisotopes....Oct. 177
Printer, Charactron high speed....Apr. 203
Production drawings, streamlining..Sept. 161
Prototypes bridge gap between design and manufacturing, plastic ....June 182
Pulse transformer ....July 187
Pump-motor unit, Atlantic....May 133
Purge fuel tanks, how to....Oct. 202
Push-pull, mechanical—a remote control for industrial use ....Aug. 153
Putting ultrasonics to work....Aug. 180
Pyramids, nomograph for the volume of cones and ....Nov. 207
Quartz paper, NRL develops....July 187

—R—

Radar makes deadeye pilots....Mar. 191
Radii of curvature in slider-crank mechanisms ....June 126
Radioactive cobalt helps explain why porcelain enamels adhere....June 188
Radioactive radium-beryllium....Dec. 200
Radioisotopes, primer on....Oct. 177
Reaction forces on bevel gear drives ....Mar. 199
Recommended practices for designing porcelain enamel products....Nov. 178
Recorder uses electrode instead of pen ....Aug. 191
Recording system, an improved creep measuring and ....Jan. 172
Rectifiers, higher current metallic..June 119
Redesign for producibility based on new welding technique ....Dec. 174
Reducing drafting man-hours with printed acetate drawings....July 134
Reducing product noise with acoustic materials ....Sept. 162
Reflection plotter helps avoid collision at sea ....Apr. 211
Relays and devices for industrial motor controllers, direct-current ....Dec. 167
Relays for motor protection, overload ....Aug. 130
Remote control microscope ....Feb. 196
Removable keyless couplings for motor-generator sets ....June 123
Research and development programs rebuild Germany's position in industrial markets ....May 227
Research, government ....July 113
Research institutes, BIR cracks down on non-profit ....Nov. 201
Research, using university facilities for industrial ....Oct. 185
Residual stresses in springs....July 148
Resistance wire computing device for solving algebraic equations....Feb. 134
Resistors, current trends in fixed..Mar. 124
Reversal paper makes positives without negatives ....July 180
Rigid vinyl, a structural plastic....July 160
Ring gear deburring machine....May 138
Road breaker tool, engine piston drives ....Dec. 138
Rotor inertias by the pendulum method, determining ....May 233
Round bar slides for machines....Dec. 162
Rubber adhesives, engineering uses for ....Feb. 130
Rubber and fiber expansion joint...Feb. 198
Rubber cushion springs for torque load applications, elastic ....Mar. 119
Rubber, what you should know about hard ....Feb. 168
Ruggedized instruments represent complete redesign ....Dec. 146
Russian MIG shows top notch engineering ....Aug. 194
Russian Stalinets tractor ....Oct. 154
Russians copy U. S. tractor design..July 186

—S—

Saco-Lowell winder ....Aug. 148
Safety circuits for hydraulic machines ....Aug. 124
Safety, nuts, ordnance corps standards for commercial ....Oct. 209
Salary control, congress removes professional engineers from....Aug. 190
Saw blades, box strapping cuts stainless steel better than....July 180
Scanner, all-electronic ....Dec. 200
Screening tests to place graduates properly ....May 218
Screw machine products, eyelet versus ....Nov. 181
Sealant, metal (abstract) ....May 295
Seamless steel tubing by Ugine-Sejournet hot extrusion process ....Mar. 192
Selecting hard facing materials to resist impact, heat, friction, abrasion..Mar. 154
Selecting metals for low temperature service ....June 158
Selecting motor-mounted magnetic brakes ....July 119
Correction ....Oct. 290
Selecting the right journal bearing material ....Sept. 119
Sensing device turns computer into robot ....Apr. 191
Sensitivity of bearing materials to abrasive dirt in oil supply....Dec. 155
Sensor for automatic check signer..Oct. 162
Servo stability, logarithmic analysis of ....Apr. 186
Shafts, critical speeds of end supported, bare ....July 193
Shafts, low costs methods of coupling small diameter ....Jan. 184
Shaker motion for a conveyor application, analysis of a....Apr. 134
Shaker table mounted on metal straps ....June 140
Shell molding ....June 113
Shell molding saves through greater mechanization and less machining ....Oct. 121
Significance of separation in hydrodynamic design ....July 152
Simple controls have sales appeal..Sept. 190
Sinusoidal calibration table for vibration type transducers ....Dec. 172
Slide rule short cuts....Feb. 272
Slider-crank mechanisms, radii of curvature in ....June 126
Slides for machines, round bar....Dec. 162
Slitter-rewinder uses all hydraulically driven rollers, high-speed....Jan. 146
Soldering, induction brazing and (abstract) ....Sept. 254
Solids pump uses compressed air and diaphragm valves ....Dec. 140
Solution of the cubic equation by a simplified proceduro ....Sept. 183
Some newer organic protective coatings ....Aug. 167
Some practical aspects of specifying surface finishes ....Dec. 150
Special engineering groups, one solution to design bottlenecks ....May 182
Spindles for internal grinding machines, air turbine driven....Mar. 160
Spotwelding highly stressed aluminum and magnesium assemblies....Mar. 185
Spring loaded worm gear makes feed on drill press pressure sensitive...June 136
Spring, temperature compensated..Mar. 152
Springs, drill press accessory makes uniform ....Aug. 143
Springs for precision measurement, designing ....Apr. 152
Springs for torque load applications, elastic rubber cushion....Mar. 119
Springs, residual stresses in....July 148
Springs, unusual uses for helical wire ....Dec. 160
Spur and bevel gears, stress chart for ....Nov. 203
Stainless clad copper for high temperature service ....Apr. 129
Stainless steel ....Jan. 115
Stainless steel diaphragm in pump-motor unit ....May 133
Stainless steel syringe....May 134
Stalinetz tractor, Russian....Oct. 154
Stampings, small part ....Jan. 162
Stampings, better design permits cheaper (abstract) ....Aug. 260
Stampings reduce cost of .22 caliber target pistol ....June 146
Status of plastics in industry today..Oct. 128
Steel or die castings, hard chromium plate and bright plating of (abstract) ....Aug. 254
Straightening press, Hufford....Aug. 150
Strain gage transducers for measurements and control....Nov. 121
Strain measuring technique is simpler, more sensitive ....Apr. 211
Streamlining production drawings..Sept. 161
Streamlining the selection of rectangular wire helical springs....June 155
Strength properties of welds in 61S-T6 aluminum alloy sheet....June 148
Stress chart for spur and bevel gears ....Nov. 203
Stress charts for pressurized elliptical and oblong tubes ....June 195
Correction ....Nov. 286
Stress corrosion ....June 189
Stretch forming reduces acrylic crazing ....Oct. 176
Structural analysis of control rods..Oct. 172
Styrenes, new high impact....Sept. 194
Surface finishes, specifying....Dec. 150
Surfagage ....May 231
Surface measurements, microinterferometry for ....Aug. 156
Swaged housing ring grooves to retain axial thrust bearings....Nov. 149
Synchronous power, the hysteresis motor for ....Dec. 167
Synthetic lubricant, air force and navy agree on new ....Jan. 284
Synthetic rubber, DuPont tests new ....June 191
Synthetic rubber plant, government..Feb. 199

—T—

Tachometer motor with magnetic lock ..... July 146
Tapered cantilever bars, fundamental transverse frequencies of ..... Aug. 175
Target pistol, stampings reduce cost ..... June 146
Teflon components and coatings ..... Sept. 149
Telescriber, combined electro-mechanical action of ..... July 142
Temperature compensated spring ..... Mar. 152
Temperature indicators, army QMC develops fast working ..... May 229
Templates of detail profiles promote drafting efficiency ..... Nov. 178
Test laboratory, General Electric ..... July 179
Thermo-Fax duplicator reproduces with heat ..... Nov. 162
Thermosetting plastic replaces steel in auto die ..... Oct. 202
Thermostats, closer temperature differentials in bimetallic ..... Apr. 179
Thirteen ways to use magnetic amplifiers ..... Sept. 144
Thirteen ways to use metallic bellows ..... June 162
Thread insert locks bushing ..... Oct. 164
Threaded members, locking ..... Oct. 148
Threaded parts, how to provide for backlash in ..... Sept. 154
Tolerance specifications ..... Aug. 284
Torque motor as a control device ..... Aug. 119
Torsional fatigue failures ..... Mar. 168
Tower network speeds TV from coast to coast ..... Jan. 194
Training today's engineers ..... May 214
Transducers for measurement and control, strain gage ..... Nov. 121
Transistors ..... Apr. 208
Transistors, Germanium (abstract) ..... Dec. 270
Transistors, RCA develops high frequency ..... Oct. 306
Transversing mechanisms used on winding machines ..... May 144
Tropical communications equipment ..... June 188
Tube reliability in industrial circuits, increasing ..... June 175
Tubes, stress charts for pressurized elliptical and oblong ..... June 195
Correction ..... Nov. 286
Tuition, pay-or-you-go ..... Oct. 203
Turboprop airplane power plant ..... Mar. 194
Twelve place math more ..... Sept. 274
Twin-action piston in hydraulic control actuator ..... Dec. 148

—U—

Ultrasonics ..... Aug. 180
Ultrasonics—inspection applications grow (abstract) ..... Oct. 256
Unusual uses for helical wire springs ..... Dec. 160
Using Taylor's series to solve spiral gear problems ..... Dec. 217
Using the patent office files as a design source ..... Feb. 191
Using university facilities for industrial research ..... Oct. 185

—V—

Vacuum cleaner, Lewyt ..... Jan. 142
Valves, solids pumps uses compressed air and diaphragm ..... Dec. 140
Vanadium as an engineering material (abstract) ..... Feb. 262
Vapor quick-dries paints chemically ..... Oct. 310
Various methods of locking threaded members ..... Oct. 148
Vertical grinder, Blanchard ..... July 136
Vibration isolation, effects of resilient foundations on ..... Nov. 170
Vibration problems, equivalent dynamical systems for complex ..... July 130
Vibration type transducers sinusoidal calibration table for ..... Dec. 172
Vinyl plastisols ..... Jan. 154
Vinyl, rigid ..... July 160
Voicewriter, Edison ..... Nov. 158
Voltage amplifiers ..... July 158
Voltage amplifiers, power and ..... Aug. 178
Voltage wave form analysis, using cathode ray tubes for ..... Oct. 190

—W-Z—

Water condenser for clothes dryer ..... Aug. 142
Wax filamented model billets aid study of material flow ..... Apr. 158
Wear of metals (abstract) ..... Mar. 254
Welded construction reduces pump weight ..... Mar. 142
Welding, aluminum (abstract) ..... July 294
Welding modular cast iron ..... Dec. 174
Welding torch ..... Oct. 164
Welding 17 Cr. stainless (abstract) ..... Sept. 266
Welds in 61S-T6 aluminum alloy sheet, strength properties of ..... June 148
Wet blasting equipment ..... Jan. 197
What you should know about hard rubber ..... Feb. 168
Wheelon press ..... June 139
Willys lightweight car ..... Feb. 144
Winder, Saco-Lowell ..... Aug. 148
Winding machines, traversing mechanisms used on ..... May 144
Wire stitching, metal ..... Apr. 156
Xenon-filled rectifier, RCA produces rugged ..... Jan. 284
Zinc availability ..... Nov. 201

CLASSIFIED INDEX

DESIGN ANALYSIS AND CALCULATIONS

Aircraft design ..... Sept. 113
Alignment chart for face gears ..... July 189
Allowable design loads for aluminum columns ..... Aug. 197
Analysis of a shaker motion for a conveyor application ..... Apr. 134
Analysis of a symmetrical five-bar linkage ..... Jan. 175
Reference book sheet ..... Jan. 201
Ball bearing vibration, cutting ..... Apr. 286
Bending roll design analysis ..... Jan. 133
Compression springs, design charts for large ..... Feb. 203
Comment ..... July 262
Converting decimal fractions to actual gear ratios ..... Aug. 158
Correction ..... Oct. 290
Corrosion factors in design and lubrication ..... Oct. 142
Critical look at fatigue equations ..... July 150
Critical speeds of end supported, bare shafts ..... July 193
Design defects cause many air force accidents ..... Mar. 194
Design of coupled overhung shafts ..... Mar. 175
Determining rotor inertias by the pendulum method ..... May 233
Effects on resilient foundations on vibration isolation ..... Nov. 170
Elastic elongation of chains ..... Feb. 176
Engine firing, how carbon deposits affect automobile ..... Mar. 197
Equivalent dynamical systems for complex vibration problems ..... July 130
Estimating the weights of joints in cylindrical vessels ..... Dec. 213
Fitting machines to men ..... Mar. 164
Fundamental transverse frequencies of tapered cantilever bars ..... Aug. 175
High speed photography in design ..... Sept. 167
High-speed camera systems ..... Sept. 182A
Correction ..... Nov. 294
Internal stresses in cast iron (abstract) ..... Oct. 266
Isolating the noise and vibration of rotating machines ..... June 151
Miniature calculator ..... Oct. 160
Nomograph for the volume of cones and pyramids ..... Nov. 207
Nomograph to simplify gear tooth calculations ..... Sept. 205
Operation and application of the differential analyzer ..... Apr. 164
Correction ..... July 272
Porcelain enamel products, designing ..... Nov. 176
Radii of curvature in slider-crank mechanisms ..... June 126
Reducing product noise with acoustic materials ..... Sept. 162
Residual stresses in springs ..... July 148
Resistance wire computing device for solving algebraic equations ..... Feb. 134
Simple controls have sales appeal ..... Sept. 190
Solution of the cubic equation by a simplified procedure ..... Sept. 183
Shaker table mounted on metal straps ..... June 140
Sinusoidal calibration table for vibration type transducers ..... Dec. 172
Strain gage transducers for measurement and control ..... Nov. 121
Strain measuring technique is simpler, more sensitive ..... Apr. 211
Stress chart for spur and bevel gears 203
Stress charts for pressurized elliptical and oblong tubes ..... June 195
Correction ..... Nov. 286
Stress corrosion ..... June 189
Structural analysis of control rods ..... Oct. 173
Tolerance specifications ..... Aug. 284
Torsional fatigue failures ..... Mar. 168
Wax filamented model billets aid study of material flow ..... Apr. 158

ELECTRIC MOTORS, PARTS AND CONTROLS

Adjustable frequency multi-motor drives ..... May 146
Adjustable speed characteristics of d-c motors ..... Mar. 180
Aluminum parts cut weight of marine diesel ..... Dec. 144
Closer temperature differentials in bimetallic thermostats ..... Apr. 179
Current limiting circuit (abstract) ..... Apr. 274
Current trends in fixed resistors ..... Mar. 124
Current trends in potentiometers ..... Oct. 166
D-c brakes for a-c motors ..... Sept. 156
Determining rotor inertias by the pendulum method ..... May 233
Direct-current relays and devices for industrial motor controllers ..... Dec. 181
Effects of rotor design on a-c motor performance ..... July 124
Electric heating elements ..... Oct. 205
Fire detection system ..... Sept. 134
Germanium transistors (abstract) ..... Dec. 270
Higher current metallic rectifiers ..... June 119
How adjustable speed electronic drives compare ..... Nov. 189
How big a motor? ..... Sept. 142
Hydraulic press brakes ..... Sept. 138
Hysteresis motor for synchronous power ..... Dec. 167
Logarithmic analysis of servo stability ..... Apr. 186
Magnetic ship models laboratory ..... Feb. 194
Magnetically operated disk brake for electric motors ..... Apr. 148
Miniature circuit breaker ..... Dec. 142
Modern control circuits for electric brakes and clutches ..... Feb. 138
Motor application to household refrigeration compressors (abstract) ..... Aug. 268
Multi-contact electrical connectors ..... Nov. 184
Overload relays for motor protection ..... Aug. 130
Permanent magnets, applications of high strength ..... May 140
Removable keyless couplings for motor-generator sets ..... June 123
Ruggedized instruments represent complete redesign ..... Dec 146
Selecting motor-mounted magnetic brakes ..... July 119
Correction ..... Oct. 290
Sensing device turns computer into robot ..... Apr. 191
Strain gage transducers for measurement and control 121
Tachometer motor with magnetic lock ..... July 146
Telescriber, combined electro-mechanical action of ..... July 142
Thirteen ways to use magnetic amplifiers ..... Sept. 144
Torque motor as a control device ..... Aug. 119
Vertical grinder, Blanchard ..... July 136

ELECTRONIC UNITS AND CIRCUITS

Adjustable transformer motor speed controls ..... Jan. 178
Cathode ray tubes for voltage wave form analysis ..... Oct. 190
Charactron high speed printer ..... Apr. 203
Current limiting circuit (abstract) ..... Apr. 274
Current trends in potentiometers ..... Oct. 166
Electronic ferrite applications (abstract) ..... May 288
Electronic flip-flop ..... Feb. 124
Electronic simulator ..... Apr. 205
Electronic tubes, how to detect failing ..... Dec. 194
Electronic units ..... Feb. 115
Fire detection system ..... Sept. 134
Higher current metallic rectifiers ..... June 119
How adjustable speed electronic drives compare ..... Nov. 189
Hydraulic press brakes ..... Sept. 138
Improved creep measuring and recording system ..... Jan. 172
Increasing tube reliability in industrial circuits ..... June 175
Logarithmic analysis of servo stability ..... Apr. 186
Magnetic robot helmsman to steer navy flattops ..... Mar. 189
Magnetic starter responds to refrigeration temperatures ..... Sept. 140
Power and voltage amplifiers ..... Aug. 178

Pulse transformer ..... July 187
Scanner, all-electronic ..... Dec. 200
Sensing device turns computer into robot ..... Apr. 191
Strain gage transducers for measurement and control ..... Nov. 121
Thirteen ways to use magnetic amplifiers ..... Sept. 144
Transistors ..... Apr. 208
Vertical grinder, Blanchard ..... July 136
Voltage amplifiers ..... July 158

ENGINEERING DEPARTMENT OPERATION

An open door policy for inventors.. Dec. 129
Armed forces personnel requirements may cause employment problems ..... Mar. 190
Computers to solve defense problems ..... Sept. 198
Contacting engineering graduates for employment ..... May 206
Design versus development ..... May 178
Duplicator reproduces with heat, Thermo-Fax ..... Nov. 162
Engineer supply shorter in 1952.... Mar. 190
Engineering department procedure in design of preproduction models. Jan. 157
Engineering manpower problem.... May 210
Engineering reports ..... May 220
Engineering shortage, Lockheed moves to ease ..... Mar. 190
Engineering your company's future (special section) ..... May 151
Essentials of engineering management ..... May 152
Correlating the philosophy and practices of research ..... May 174
Design versus development.... May 178
One solution to design bottlenecks: special engineering groups..... May 182
Templets + photography = low cost drawings ..... May 186
Control of paperwork..... May 191
Engineering foresight that aids production ..... May 190
Matching the job and the man.. May 198
Financial incentives for engineers ..... May 202
Contacting engineering graduates for employment ..... May 206
What must be done to solve the engineering manpower problem..... May 210
Training today's engineers..... May 214
To place graduates properly: try screening tests ..... May 218
Engineering reports are vital to good management ..... May 220
Executive opinion: the key is personnel ..... May 224
Engineers, manpower commission study urges better use of..... Oct. 203
Essentials of engineering management ..... May 152
Executive opinion: the key is personnel ..... May 224
Financial incentives for engineers... May 202
Fine-pitch gear drawing data required to assure quality..... July 174
Correction ..... Oct. 290
Comments ..... Nov. 278
Government research ..... July 113
Industry training for co-op engineering students (abstract) ..... July 244
Low cost drawings, templets + photography ..... May 186
Matching the job and the man..... May 198
Materials shortage ..... Apr. 117
Models to train pilots and mechanics, navy uses mobile working..... June 186
Operation and application of the differential analyzer ..... Apr. 164
Correction ..... July 272
Organizing a computer center in the engineering department ..... Jan. 137
Comment ..... Apr. 226
Comment ..... June 264
Paperwork in engineering, control of ..... May 191
Patent codification goes into effect, new ..... Nov. 200
Patent office cuts application backlog ..... Sept. 203
Plastic prototypes bridge gap between design and manufacturing..... June 182
Reducing drafting manhours with printed acetate drawings ..... July 124
Salary control, congress removes professional engineers from..... Aug. 190
Screening tests to place graduates properly ..... May 218
Shell molding ..... June 113
Slide rule short cuts..... Feb. 272
Some practical aspects of specifying surface finishes 150
Special engineering groups, one solution to design bottlenecks..... May 182
Streamlining production drawings.. Sept. 161
Templates of detail profiles promote drafting efficiency ..... Nov. 178
Training today's engineers..... May 214
Tuition load, pay-as-you-go lightens. Oct. 203
Using the patent office files as a design source ..... Feb. 191
Using university facilities for industrial research ..... Oct. 185

FINISHES AND COATINGS

Aerosol paint units, big future..... Apr. 198
Aldip process coats ferrous metals with aluminum ..... Aug. 193
Chromate protective coatings..... Sept. 127
Corrosion protection, new..... June 189
Finishes for plastics..... June 167
Flame plating applies hard surface.. Oct. 200
Hard chromium coatings for ferrous parts ..... Aug. 164
Hard chromium plate and bright plating of steel or die castings (abstract) ..... Aug. 254
HEA coatings (abstract) ..... Dec. 278
Impregnation cuts casting porosity rejects ..... Feb. 193
Lacquer thinners improve auto finishes ..... May 231
Metal sandwich decorates plastic parts ..... Aug. 177
More about ceramic coatings..... Oct. 134
Neoprene protective coatings..... Aug. 138
Objectives in industrial design..... Apr. 171
Phosphate coatings for military products ..... Feb. 183
Porcelain enamel products..... Nov. 176
Some newer organic protective coatings ..... Aug. 167
Specifying surface finishes ..... Dec. 150
Teflon components and coatings... Sept. 149

HYDRAULIC AND PNEUMATIC DRIVES AND CONTROLS

Air turbine driven spindles for internal grinding machines ..... Mar. 160
Automatic core maker pneumatically powered ..... July 140
Band tool, DoAll..... Apr. 146
Coal locomotive, GE..... Apr. 150
Controllers, liquid level indicators and ..... Mar. 140
Eleven ways to oil, lubricate ball bearings ..... Feb. 166
Fluid flow losses through orifices... May 237
Fluid flow through orifices..... Apr. 213
Hufford straightening press..... Aug. 150
Hydraulic noise reduction by capacitive load chamber ..... Mar. 135
Hydraulic noise reduction by fluid conditioning ..... Apr. 182
Hydraulic noise reduction by piston pump modification ..... Feb. 178
Hydraulic press brakes..... Sept. 138
Hydraulic steering, Buick..... Feb. 149
Hydraulic straightener ..... Nov. 169
Improve circuit performance with hydraulic accumulators ..... Oct. 192
Oil drilling drawworks..... Sept. 130
Piston and diaphragm pump controlled volume ..... Nov. 165
Significance of separation in hydrodynamic design ..... July 152
Liquid sensing device with no moving parts ..... June 124
Multiple pressure hydraulic system.. Jan. 186
Oil additives, application and function of gear (abstract)..... Jan. 242
Pump-motor unit, Atlantic..... May 133
Purge fuel tanks, how to..... Oct. 202
Safety circuits for hydraulic machines ..... Aug. 124
Slitter-rewinder uses all hydraulically driven rollers, high-speed..... Jan. 146
Solids pump uses compressed air and diaphragm valves ..... Dec. 140
Twin-action piston in hydraulic control actuator ..... Dec. 148
Welded construction reduces pump weight ..... Mar. 142

LUBRICATION

Corrosion factors in design and lubrication ..... Oct. 142
Oil flow in plain journal bearings analyzed ..... Apr. 210
Gas turbine bearing lubrication problems (abstract) ..... Feb. 250
Sensitivity of bearing materials to abrasive dirt in oil supply..... Dec. 155

MATERIALS—METALS FERROUS

Aluminum and nickel..... Mar. 113
Brittleness of steel, effects of nitrogen on low temperature ..... Apr. 204
Chromium stainless steels, properties of ..... Jan. 117
Composite metals: a new key to design flexibility ..... Nov. 153
Critical look at fatigue equations... July 150
Ductile cast iron, NBS reports on.. May 230
Expanded metal ..... Apr. 199
Gas turbine engine materials (abstract) ..... July 248
Gray-iron castings (abstract) ..... Apr. 278
Hard chromium coatings for ferrous parts ..... Aug. 164
High temperature service, how can we appraise metals for (abstract).. June 250
Hot pressing powdered metals (abstract) ..... Aug. 276
Internal stresses in cast iron (abstract) ..... Oct. 266
Leaner alloys for high temperature use (abstract) ..... May 282
Low temperature properties of ingot iron ..... Sept. 202
Machinability (abstract) ..... Nov. 268
Materials austerity programs..... June 192
Materials availability ..... May 113
Materials expansion ..... Aug. 192
Materials needed for super-speed airplanes ..... Oct. 198
Materials shortages..... Apr. 117, Oct. 115
Metal-carbon composites for mechanical and electrical parts ..... Nov. 173
Mollerizing iron and steel..... May 231
More about ceramic coatings..... Oct. 134
Permanent magnets, applications of high strength ..... May 140
Redesign for producibility based on new welding technique ..... Dec. 174
Selecting hard facing materials to resist impact, heat, friction, abrasion. Mar. 154
Selecting metals for low temperature service ..... June 158
Selecting the right journal bearing material ..... Sept. 119
Shell molding ..... June 119
Shell molding saves through greater mechanization and less machining ..... Oct. 121
Stainless clad copper for high temperature service ..... Apr. 129
Stainless steel ..... Jan. 115
Stainless steel diaphragm in pump-motor unit ..... May 133
Stainless steel syringe..... May 134
Wear of metals (abstract)..... Mar. 254
Welding 17 Cr stainless (abstract).. Sept. 266

MATERIALS—METALS NONFERROUS

Aluminum and nickel..... Mar. 113
Aluminum, new ways to use..... Sept. 197
Aluminum, process plates at room temperature ..... July 180
Aluminum welding (abstract)..... July 254
Applications extended for aluminum bonding ..... Dec. 134
Composite metals: a new key to design flexibility ..... Nov. 153
Copper and aluminum..... Feb. 113
Copper creep investigations, NBS reports on ..... Feb. 201
Critical look at fatigue equations... July 150
Die casting design (abstract)..... Nov. 258
Electronic ferrite applications (abstract) ..... May 288
Expanded metal ..... Apr. 199
Exposure meter, midget..... Jan. 152
Fatigue properties of cast aluminum alloys ..... May 119
Flux bath dip brazing of aluminum alloys ..... Feb. 173
Forgings and extrusions, how to use copper alloys in (abstract) ..... June 242
Forgings, large ..... Dec. 123
Germanium transistors (abstract).. Dec. 270
Germanium will miniaturize electronic components, GE predicts..... Mar. 179
Heat-resisting sintered aluminum (abstract) ..... Apr. 270
High temperature reduces pure nickel tensile strength ..... Sept. 202
High-temperature service, how can we appraise metals for (abstract).. June 250
Hot forming aluminum alloys..... July 163
Leaner alloys for high temperature use (abstract) ..... May 282
Machinability (abstract) ..... Nov. 268
Magnesium castings and forgings designing (abstract) ..... Dec. 263
Materials austerity programs..... June 192
Materials availability ..... May 113
Materials expansion ..... Aug. 192
Materials needed for super-speed airplanes ..... Oct. 198
Materials, new process will boost copper, nickel and cobalt supplies..... July 184
Materials shortages..... Apr. 117, Oct. 115
Molybdenum our most promising refractory metal ..... Jan. 121
More about ceramic coatings..... Oct. 134
Nickel-aluminum bronze (abstract). Mar. 248
Powder metal, how it is being made. Oct. 153
Reducing product noise with acoustic materials ..... Sept. 162
Selecting hard facing materials to resist impact, heat, friction, abrasion ..... Mar. 154
Selecting the right journal bearing material ..... Sept. 119
Sensitivity of bearing materials to abrasive dirt in oil supply ..... Dec. 155

Shell, molding saves through greater mechanization and less machining ..... Oct. 121
Spotwelding highly stressed aluminum and magnesium assemblies ... Mar. 185
Stainless clad copper for high temperature service ..... Apr. 129
Strength properties of welds in 61S-T6 aluminum alloy sheet ..... June 148
Wear of metals (abstract) ..... Mar. 254
Vanadium as an engineering material (abstract) ..... Feb. 262

MATERIALS—NON-METAL PLASTICS

Beater saturated gasketing materials ..... June 164
Better ways of evaluating properties of plastics ..... Mar. 130
Dry coloring—a revolution in plastics ..... Mar. 196
Engineering potential of polyethylene ..... July 168
Extruded plastic parts ..... Oct. 150
Fabric base phenolic laminate in paper mill ..... May 130
Finishes for plastics ..... June 167
Foam plastic adds strength to aircraft structures ..... Nov. 199
Foam plastics ..... Apr. 192
Heat-resistant adhesives, properties of some (abstract) ..... July 236
Low cost process molds plastic electrical insulators from laminac resin ... July 182
Metal sandwich decorates plastic parts ..... Aug. 177
New high impact styrenes ..... Sept. 194
Nylon parts for ball bearings ..... Feb. 119
Plastic blowers for electric motors .. July 147
Plastic body simplifies design of electrical jack plug ..... May 136
Plastic dies stamp out aircraft parts ..... Apr. 211
Plastic molded motor, first ..... Jan. 195
Plastic pipe research, SPI sponsors .. Oct. 201
Plastic prototypes bridge gap between design and manufacturing ..... June 182
Plastic sheath protects cylindrical parts ..... July 185
Plastics availability ..... Aug. 113
Plastigels (abstract) ..... Mar. 252
Rigid vinyl, a structural plastic .... July 160
Status of plastics in industry today .. Oct. 128
Stretch forming reduces acrylic crazing ..... Oct. 176
Teflon components and coatings .... Sept. 149
Thermosetting plastic replaces steel in auto die ..... Oct. 202
Use of plastic parts improve Lewyt vacuum cleaner ..... Jan. 142
Vinyl plastisols ..... Jan. 154

MATERIALS—NON-METAL MISCELLANEOUS

Carborundum abrasive peels vegetables ..... Mar. 148
Ceramic permanent magnet replaces metal with oxides ..... Mar. 197
Hard rubber ..... Feb. 168
Materials availability ..... May 113
Materials expansion ..... Aug. 192
Materials needed for super-speed airplanes ..... Oct. 198
Metal-carbon composites for mechanical and electrical parts ..... Nov. 173
Methods of attaching glass to metal structures ..... July 166
Neoprene protective coatings ..... Aug. 133
Plywood plating tank ..... Apr. 150
Rubber adhesives ..... Feb. 120
Synthetic rubber, DuPont tests new .. June 191

MECHANICAL PARTS AND MECHANISMS

Automatic check signer ..... Oct. 162
Ball bearing vibration, cutting ..... Apr. 286
Bonded joints in the construction of metal aircraft (abstract) ..... Oct. 276
Camera, Ansco Karomat ..... Nov. 166
Compression springs, design charts for large ..... Feb. 203
comment ..... July 262
Couplings for small diameter shafts, low cost ..... May 306
Crane brake, mechanically operated switch sets ..... Jan. 145
Designing for less friction ..... May 124
Designing springs for precision measurement ..... Apr. 152
Dividing head has direct reading scales ..... July 139
Effects of resilient foundations on vibration isolation ..... Nov. 170
Elastic elongation of chains ..... Feb. 176
Elastic rubber cushion springs for torque load applications ..... Mar. 119
Eleven ways to oil lubricate ball bearings ..... Feb. 166
Engine piston drives road breaker tool ..... Dec. 138
Gas turbine bearing lubrication problems (abstract) ..... Feb. 250
How to design parts that assemble and lock by twisting ..... Aug. 162
How to provide for backlash in threaded parts ..... Sept. 154
How to specify precision knurls ..... May 142
Isolating the noise and vibration of rotating machines ..... June 151
Jet starter ..... May 136
Low costs methods of coupling small diameter shafts ..... Jan. 134
Mechanical push-pull, a remote control for industrial use ..... Aug. 152
Moving-coil makes fast-acting clutch ..... Dec. 199
Nylon parts for ball bearings ..... Feb. 119
Optimum selection of gears for precision instrument drives ..... Jan. 166
comment ..... Apr. 282
Ordnance corps standards for commercial safety nuts ..... Oct. 209
Radii of curvature in slider-crank mechanisms ..... June 126
Residual stresses in springs ..... July 148
Round bar slides for machines ..... Dec. 162
Saco-Lowell winder ..... Aug. 148
Selecting needle bearings ..... Apr. 123
Selecting the right journal bearing material ..... Sept. 119
Sensitivity of bearing materials to abrasive dirt in oil supply ..... Dec. 135
Solids pump uses compressed air and diaphragm valves ..... Dec. 140
Starret calculator ..... Aug. 140
Streamlining the selection of rectangular wire helical springs ..... June 155
Stress chart for spur and bevel gears ..... Nov. 203
Stress charts for pressurized elliptical and oblong tubes ..... June 195
Correction ..... Nov. 286
Structural analysis of control rods .. Oct. 173
Swaged housing ring grooves to retain axial thrust bearings ..... Nov. 149
Traversing mechanisms used on winding machines ..... May 144
Uses for helical wire springs ..... Dec. 160
Using Taylor's series to solve spiral gear problems ..... Dec. 217
Various methods of locking threaded members ..... Oct. 148
Ways to use metallic bellows ..... June 162

POWER TRANSMISSION

Air compressor, Kidde ..... Apr. 140
Air turbine driven spindles for internal grinding machines ..... Mar. 160
Alignment chart for face gears ..... July 189
Aluminum parts cut weight of marine diesel ..... Dec. 144
Analysis of a shaker motion for a conveyor application ..... Apr. 134
Converting decimal fractions to actual gear ratios ..... Aug. 158
Correction ..... Oct. 290
Critical speeds of end supported, bare shafts ..... July 193
Design of coupled overhung shafts .. Mar. 175
Differential drive uses no gears ..... July 144
Dividing head has direct reading scales ..... July 139
Engine piston drives road breaker tool ..... Dec. 138
Fine-pitch gear drawing data required to assure quality ..... July 174
correction ..... Oct. 290
Comments ..... Nov. 278
Liquid mixer ..... Sept. 136
Magna drill ..... June 136
Mechanical push-pull, a remote control for industrial use ..... Aug. 152
Nomograph to simplify gear tooth calculations ..... Sept. 205
Reaction forces on bevel gear drives .. Mar. 199
Removable keyless couplings for motor-generator sets ..... June 123
Ring gear deburring machine ..... May 138
Selecting motor - mounted magnetic brakes ..... July 119
correction ..... Oct. 290
Telescriber, combined electro-mechanical action of ..... July 142
Tooth tread tire serves as drive gear ..... Mar. 150
Turbo-prop airplane power plant ... Mar. 194
Using Taylor's series to solve spiral gear problems ..... Dec. 217

PRODUCT DESCRIPTIONS

Accelerometer, Bendix ..... Mar. 152
Air compressor, Kidde ..... Apr. 140
Air conditioner ..... Aug. 146
Altimeter with stationary diaphragm ..... July 146
Aluminum parts cut weight of marine diesel ..... Dec. 144
Atlantic pump-motor unit ..... May 133
Automatic check signer ..... Oct. 162
Automatic core maker pneumatically powered ..... July 140
Band tool, DoAll ..... Apr. 146
Bearing cartridge for freight cars, interchangeable ..... Mar. 152
Bendix accelerometer ..... Mar. 152
Bimetallic thermostats ..... Apr. 179
Blade sharpener, worm drive used on ..... Jan. 153
Blanchard vertical grinder ..... July 136
1952 Buick ..... Feb. 149
Calculator, Starret ..... Aug. 140
Camera, Ansco Karomat ..... Nov. 166
Carborundum abrasive peels vegetables ..... Mar. 148
Charactron high speed printer ..... Apr. 203
Circuit measures vibration decay constant ..... Dec. 148
Coal-buring locomotive gas turbine .. May 228
Coal locomotive, GE ..... Apr. 156
Combination lock, clickless ..... Apr. 148
Crane brake, mechanically operated switch sets ..... Jan. 145
Diesel engine cooled by forced air ... Jan. 150
correction ..... Apr. 292
Differential drive uses no gears ..... July 144
Dividing head has direct reading scales ..... July 139
Double drive motor powers electric torpedo ..... June 146
Drill press accessory makes uniform springs ..... Aug. 143
Duplicator reproduces with heat, Thermo-Fax ..... Nov. 162
Electrical jack plug ..... May 136
Electronic simulator ..... Apr. 205
Engine piston drives road breaker tool ..... Dec. 138
Exposure meter, midget ..... Jan. 152
Extensometer contacts bolt ends in tensile test ..... Sept. 140
Fabric base phenolic laminate in paper mill ..... May 130
Fan, GE household ..... July 144
Fire detection system ..... Sept. 134
Ford goes to valve overhead six cylinder engine ..... Feb. 156
Ford reveals styles of the future in car designs ..... Mar. 196
Foreign cars, structural features of several ..... Mar. 150
Fulcrum balances floatless humidifier ..... Sept. 138
Hotpoint dryer ..... Apr. 142
Hydraulic press brakes ..... Sept. 138
Hydraulic straightener ..... Nov. 169
Ice cube maker ..... May 140
Jet starter ..... May 136
Lewyt vacuum cleaner ..... Jan. 142
Lightweight engine of die cast aluminum ..... Mar. 144
Lincoln, new model ..... Feb. 152
Liquid mixer ..... Sept. 136
Magna drill ..... June 136
Magnetic starter responds to refrigeration temperatures ..... Sept. 140
Magnetically operated disk brake for electric motors ..... Apr. 148
Mercury gets major face lifting .... Feb. 160
Miniature calculator ..... Oct. 160
Miniature circuit breaker ..... Dec. 142
Motion pictures of TV produced in one minute ..... Aug. 144
Nylon heat setting machine ..... Apr. 144
Oil drilling drawworks ..... Sept. 130
Oil pump ..... Mar. 142
Oscilloscope camera photographs identifying data ..... Dec. 142
Packard cars restyled ..... Feb. 164
Permanent magnets ..... May 140
Piercing machine, Mueller ..... June 142
Piston and diaphragm pump controlled volume ..... Nov. 165
Pistons act paralleled to power shaft in internal combustion engine ..... Mar. 146
Plastic blowers for electric motors .. July 147
Plywood plating tank ..... Apr. 150
Power lawn mower ..... Mar. 150
Ring gear deburring machine ..... May 138
Ruggedized instruments represent complete redesign ..... Dec. 146
Russian Stalinets tractor ..... Oct. 154
Saco-Lowell winder ..... Aug. 148
Shaker table mounted on metal straps ..... June 140
Simple controls have sales appeal .. Sept. 190
Slitter-rewinder ..... Jan. 146
Solids pump uses compressed air and diaphragm valves ..... Dec. 140
Stainless steel syringe ..... May 134
Straightening press, Hufford ..... Aug. 150
Tachometer motor with magnetic lock ..... July 146
Target pistol, stampings reduce cost ..... June 146
Telescriber, combined electro-mechanical action of ..... July 142
Thread insert locks bushing ..... Oct. 164
Tooth tread tire serves as drive gear ..... Mar. 150
Twin-action piston in hydraulic control actuator ..... Dec. 148
Vertical grinder, Blanchard ..... July 136
Voicewriter, Edison ..... Nov. 158
Welding torch ..... Oct. 164
Wheelon press ..... June 139
Willys lightweight car ..... Feb. 144
Welded construction reduces pump weight ..... Mar. 142

PRODUCTION PROCESSES

Adhesives replace rivets, heat resistant ....Feb. 200
Aircraft design ....Sept. 113
Aluminum welding (abstract)....July 254
Applications extended for aluminum bonding ....Dec. 134
Bonded joints in the construction of metal aircraft (abstract)....Oct. 276
Copper alloys in die castings, how to use (abstract) ....June 246
Die casting design (abstract)....Nov. 258
Drilling technique produces curved holes ....Jan. 198
Electro-machining method (abstract) ....Sept. 260
Engineering foresight that aids production ....May 186
Extruded plastic parts....Oct. 150
Eyelet versus screw machine products ....Nov. 000
Flame plating applies hard surface..Oct. 200
Flux bath dip brazing of aluminum alloys ....Feb. 173
Forgings and extrusions, how to use copper alloys in (abstract)....June 242
Forgings, large ....Dec. 123
Gray-iron castings (abstract)....Apr. 278
Hard chromium plate and bright plating of steel or die castings (abstract) ....Aug. 254
Heat-resistant adhesives, properties of some (abstract) ....July 236
High pressure jet boosts tool life and cutting speeds ....Feb. 192
Hot forming aluminum alloys....July 163
Hot pressing powdered metals (abstract) ....Aug. 276
How to design parts that assemble and lock by twisting....Aug. 162
Impregnation cuts casting porosity rejects ....Feb. 193
Induction brazing and soldering (abstract) ....Sept. 254
Lightweight engine of die cast aluminum ....Mar. 144
Locking threaded members ....Oct. 148
Low cost process molds plastic electrical insulators from laminac resin..July 182
Machinability (abstract) ....Nov. 268
Magnesium castings and forgings (abstract) ....Dec. 263
Metal sealant (abstract)....May 295
Metal wire stitching ....Apr. 156
Methods of attaching glass to metal structures ....July 166
More about ceramic coatings....Oct. 134
Ordnance corps standards for commercial safety nuts....Oct. 209
Photographic imprint saves manhours ....Sept. 200
Plating powder metal parts, problems of (abstract) ....Jan. 246
Porcelain enamel products ....Nov. 176
Pressure welds nonferrous metals in cold process ....Nov. 198
Redesign for producibility based on new welding technique ....Dec. 174
Rubber adhesives ....Feb. 130
Saw blades, box strapping cuts stainless steel better than....July 180
Selecting hard facing materials to resist impact, heat, friction, abrasion..Mar. 154
Shell molding ....June 113
Shell molding saves through greater mechanization and less machining ....Oct. 121
Small part stampings....Jan. 162
Spotwelding highly stressed aluminum and magnesium assemblies....Mar. 185
Stampings, better design permits cheaper (abstract) ....Aug. 260
Stampings reduce cost of .22 caliber target pistol ....June 146
Strength properties of welds in 61S-T6 aluminum alloy sheet....June 148
Stretch forming reduces acrylic crazing ....Oct. 176
Swaged housing ring grooves to retain axial thrust bearings ....Nov. 149
Thermosetting plastic replaces steel in auto die ....Oct. 202
Wax filamented model billets aid study of material flow....Apr. 158
Welding 17 Cr stainless (abstract)..Sept. 266
Wheelon press ....June 139

REFERENCE BOOK SHEETS

Alignment chart for face gears....July 189
Allowable design loads for aluminum columns ....Aug. 197
Critical speeds of end supported, bare shafts ....July 193
Design charts for a five-bar linkage..Jan. 201
Design charts for large compression springs ....Feb. 203
Comment ....July 262
Determining rotor inertias by the pendulum method ....May 233
Electric heating elements....Oct. 205
Estimating the weights of joints in cylindrical vessels ....Dec. 213
Fluid flow losses through orifices...May 237
Fluid flow through orifices....Apr. 213
Nomograph for the volume of cones and pyramids ....Nov. 207
Nomograph to simplify gear tooth calculations ....Sept. 205
Ordnance corps standards for commercial safety nuts....Oct. 209
Reaction forces on bevel gear drives ....Mar. 199
Stress chart for spur and bevel gears ....Nov. 203
Stress charts for pressurized elliptical and oblong tubes....June 195
Correction ....Nov. 286
Using Taylor's series to solve spiral gear problems ....Dec. 217

RESEARCH AND TEST METHODS

Centrifuge studies human tolerance to acceleration ....Aug. 188
Computor, NBS develops tape memory for ....Jan. 199
Correlating the philosophy and practices of research ....May 174
Dilastrain method speeds research..Jan. 193
Evaluating properties of plastics....Mar. 130
Government research ....July 113
High-speed camera systems....Sept. 182A
Correction ....Nov. 294
High speed photography in design..Sept. 167
Improved creep measuring and recording system ....Jan. 172
Isotopes can control automatic processes ....July 178
Magnetic ship models laboratory opened by navy ....Feb. 194
Micro-interferometry for surface measurements ....Aug. 156
Nuclear pile, AEC reveals details of Brookhaven ....Aug. 206
Nuclear reactor, largest research...Apr. 205
Nuclear reactor, low cost....Jan. 192
Plastic pipe research, SPI sponsors..Oct. 201
Powerful fatigue tester exertas 500,000 pound force ....Apr. 209
Primer on radioisotopes....Oct. 177
Putting ultrasonics to work....Aug. 180
Remote control microscope....Feb. 196
Research and development programs rebuild Germany's position in industrial markets ....May 227
Sinusoidal calibration table for vibration type transducers ....Dec. 172
Test laboratory, General Electric...July 179
Ultrasonics—inspection applications grow (abstract) ....Oct. 256
Using university facilities for industrial research ....Oct. 185

TECHNICAL ABSTRACTS

Aluminum welding ....July 254
Bonded joints in the construction of metal aircraft ....Oct. 276
Copper alloys in die castings....June 246
Current limiting circuit....Apr. 274
Die casting design ....Nov. 258
Electro-machining method ....Sept. 260
Electronic ferrite applications....May 288
Forgings and extrusions, how to use copper alloys in ....June 242
Gas turbine bearing lubrication problems ....Feb. 250
Gas turbine engine materials....July 248
Germanium transistors ....Dec. 270
Gray-iron castings, design of....Apr. 278
Hard chromium plate and bright plating of steel or die castings....Aug. 254
HAE coatings ....Dec. 278
Heat-resistant adhesives ....July 236
Heat-resisting sintered aluminum..Apr. 270
High-temperature service, how can we appraise metals for....June 250
Hot pressing powdered metals....Aug. 276
Induction brazing and soldering..Sept. 254
Industry training for co-op engineering students ....July 244
Internal stresses in cast iron....Oct. 266
Leaner alloys for high temperature use ....May 282
Machinability ....Nov. 268
Magnesium castings and forgings..Dec. 263
Metal sealant ....May 295
Motor application to household refrigeration compressors ....Aug. 268
Nickel-aluminum bronze ....Mar. 248
Oil additives, application and function of gear ....Jan. 242
Plastigels ....Mar. 252
Plating powder metal parts....Jan. 246
Stampings, better design permits cheaper Aug. 260
Ultrasonics—inspection applications grow Oct. 256
Vanadium as an engineering material ....Feb. 262
Wear of metals ....Mar. 254
Welding 17 Cr stainless....Sept. 266

AUTHORS' INDEX

ADILETTA, Joseph—Some practical aspects of specifying surface finishes Dec. 150
ALLAN, Walter E.—Eyelet versus screw machine products ....Nov. 181
ALMEN, J. O.—Torsional fatigue failures ....Mar. 168
ALPERT, Norman—Logarithmic analysis of servo stability....Apr. 186
AROBONE, A.—Strain gage transducers for measurement and control..Nov. 121
AUDE, J.—Selecting motor-mounted magnetic brakes ....July 119
Correction ....Oct. 290
AVERY, C. H.—Swaged housing ring grooves to retain axial thrust bearings ....Nov. 149
AVERY, Howard S.—Selecting hard facing materials to resist impact, heat, friction, abrasion ....Mar. 154
BAIRD, Leslie—Multi-contact electrical connectors ....Nov. 184
BAKE, L. S.—Neoprene protective coatings ....Aug. 128
BALLEISEN, Charles E.—Using the patent office files as a design source ....Feb. 191
BARNES, Fredrik R.—Engineering department procedure in design of preproduction models ....Jan. 157
BARRETT, Louis—Strength properties of welds in 61S-T6 aluminum alloy sheet ....June 148
BARROW, George—How to specify precision knurls ....May 142
BATES, C. L.—Design versus development ....May 178
BELCHER, R. L.—A primer on radioisotopes ....Oct. 177
BERKLEY, L. H.—How big a motor? Sept. 142
BLOOMFIELD, B.—Alignment chart for face gears ....July 189
BOOSER, E. R.—Selecting the right journal bearing material....Sept. 119
BOWER, Clifford T.—How to provide for backlash in threaded parts..Sept. 154
BRADSHAW, Lilyan B.—Contacting engineering graduates for employment May 206
BREUNICH, T. R.—How adjustable speed electronic drives compare Nov. 189
BRISACK, A. G.—Swaged housing ring grooves to retain axial thrust bearings ....Nov. 149
BROTZ, Albert J.—The torque motor as a control device....Aug. 119
BUCHDAHL, Rolf—Better ways of evaluating properties of plastics....Mar. 130
BUSKER, David—Some newer organic protective coatings ....Aug. 167
CALKINS, G. D.—A primer on radioisotopes ....Oct. 177
CASADY, M. G.—Templates of detail profiles promote drafting efficiency Nov. 178
CHAYNE, Charles A.—What must be done to solve the engineering manpower problem ....May 210
COZZONE, F. P.—Organizing a computer center in the engineering department ....Jan. 137
Comment ....Apr. 286
Comment ....June 264
Comment ....Sept. 274
CUMMING, E. Perry—Thirteen ways to use metallic bellows ....June 142
DAEHLER, L. E.—Overload relays for motor protection ....Aug. 130
DAVIS, Sidney—The hysteresis motor for synchronous power ....Dec. 167
DAVISON, L. M.—Optimum selection of gears for precision instrument drives Jan. 166
Comment ....Apr. 282
DECKER, Andrew H.—Modern control circuits for electric brakes and clutches ....Feb. 134
DELMONTE, John—Vinyl plastisols Jan. 154
DOUGLAS, W. A. S.—Round bar slides for machines ....Dec. 162
DREWITZ, Edwin—Simple controls have sales appeal ....Sept. 190
DURHAM, Harold M.—Stress chart for spur and bevel gears....Nov. 203
Using Taylor's series to solve spiral gear problems ....Dec. 217
EASTMAN, J. M.—Designing for less friction ....May 124

EATON, E. P., Jr.—Metal-carbon composites for mechanical and electrical parts ..... Nov. 173
ENSMINGER, Dale—Putting ultrasonics to work ..... Aug. 180
ESHELMAN, R. H.—Control of paperwork in engineering ..... May 191
FANGEMANN, M. G.—Designing springs for precision measurement ..... Apr. 152
FIELDS, Carleton M.—Sinusoidal calibration table for vibration type transducers ..... Dec. 172
FLYNN, John B.—Electronic flip-flop as a machine element ..... Feb. 124
FYFFE, R. J.—Strain gage transducers for measurement and control ... Nov. 121
GAMBLE, Milton E.—Higher current metallic rectifiers ..... June 119
GENTIEU, Norman P.—Phosphate coatings for military products ..... Feb. 183
GIALANELLA, Joseph—Designing electric heating elements ..... Oct. 205
GLAZIER, P. R.—Key factors in selecting needle bearings ..... Apr. 123
GRODZINSKI, P.—Low cost couplings for small diameter shafts ..... May 106
HAGENBOOK, L. D.—Analysis of a shaker motion for a conveyor application ..... Apr. 134
HALL, A. S.—Analysis of a symmetrical five-bar linkage ..... Jan. 175
Charts for a five-bar linkage ..... Jan. 201
HAMM, H. W.—Liquid level indicators and controllers ..... Mar. 140
HARPER, Morrie—Templates of detail profiles promote drafting efficiency Nov. 178
HARWOOD, J. J.—Molybdenum our most promising refractory metal Jan. 121
HEFFRON, W. G.—Operation and application of the differential analyzer Apr. 164
Correction ..... July 272
Comment ..... Sept. 274
HELLER, S. R., Jr.—Nomograph for the volume of cones and pyramids .. Nov. 207
HESSE, H. C.—Design of coupled overhung shafts ..... Mar. 175
HIMELBLAU, Harry Jr.—Isolating the noise and vibration of rotating machines ..... June 151
Effects of resilient foundations on vibration isolation ..... Nov. 170
HLINSKY, E. J.—Analysis of a shaker motion for a conveyor application Apr. 134
HOBLIT, F. M.—Structural analysis of control rods ..... Oct. 173
HOLDING, J. B.—Engineering reports are vital to good management .. May 220
HOLMAN, F. H.—How big a motor? Sept. 142
HOLMES, Howard—Mechanical push-pull, a remote control for industrial use ..... Aug. 182
HOLMQUIST, J. L.—Wax filamented model billets aid study of material flow ..... Apr. 158
HORBATT, Paul F.—Reaction forces on bevel gear drives ..... Mar. 199
HOWELL, F. M.—Fatigue properties of cast aluminum alloys ..... May 119
HUCKERT, Jesse—Radii of curavature in slider-crank mechanisms .... June 126
HUFFMAN, J. W.—Improved creep measuring and recording system Jan. 172
HUNT, M. H.—Methods of attaching glass to metal structures ..... July 166
IMMEL, Ralph B.—Voltage amplifiers July 158
Power and voltage amplifiers .. Aug. 178
Cathode ray tubes for voltage wave form analysis ..... Oct. 190
Direct-current relays and devices for industrial motor controllers .... Dec. 181
INGOLS, Robert P.—Expanded metal Apr. 199
IREDELL, Robert—Elastic rubber cushion springs for torque load applications ..... Mar. 119
JAMES, H. D.—Thirteen ways to use magnetic amplifiers ..... Sept. 144
JAMIESON, G. E.—Removable keyless couplings for motor-generator sets June 122
JENKINS S.—Spotwelding highly stressed aluminum and magnesium assemblies ..... Mar. 185
JONES, Ennis E.—Solution of the cubic equation by a simplified procedure Sept. 182
KAPLAN, Robert—The torque motor as a control device ..... Aug. 119
KINNEY, Joseph, Jr.—Stainless clad copper for high temperature service Apr. 129
KOCK, D. G.—Increasing tube reliability in industrial circuits ..... June 175
KOERPER, Erhardt C.—Matching the job and the man ..... May 198
LANDIS, George—Financial incentives for engineers ..... May 202
LAUDAN, Fred P.—Engineering foresight that aids production ..... May 196
LEE, P. R.—Closer temperature differentials in bimetallic thermostats Apr. 179
LIST, F. A.—Adjustable speed characteristics of d-c motors ..... Mar. 180
Effects of rotor design on a-c motor performance ..... July 124
LORENZ, A. J.—What you should know about hard rubber ..... Feb. 168
LOUTHAN, G. W.—Hydraulic noise reduction by piston pump modification Feb. 178
Hydraulic noise reduction by capacitive load chamber ..... Mar. 135
Hydraulic noise reduction by fluid conditioning ..... Apr. 182
LYST, J. O.—Fatigue properties of cast aluminum alloys ..... May 119
MAAS, Stanley—Reducing drafting manhours with printed acetate drawings ..... July 134
MacDONALD, P. M.—Elastic elongation of chains ..... Feb. 176
MARTIN, Louis D.—Fine-pitch gear drawing data required to assure quality ..... July 174
Correction ..... Oct. 290
Comments ..... Nov. 278
MAY, Robert C.—D-c brakes for a-c motors ..... Sept. 156
McCLEERY, H. L.—Adjustable frequency multi-motor drives ..... May 146
MEAD, States M.—Essentials of engineering management ..... May 152
MEINEL, M. P.—Hot forming aluminum alloys ..... July 163
MELNITSKY, Benjamin—An open door policy for inventors ..... Dec. 129
MELVIN, Stanley R.—Finishes for plastics ..... June 167
METZ, Paul F.—Designing porcelain enamel products ..... Nov. 176
MEYERS, O. G.—Residual stresses in springs ..... July 148
MILLER, C. David—High-speed photography in design ..... Sept. 167
High-speed camera systems .. Sept. 182A
Correction ..... Nov. 294
MUELLER, Paul M.—Air turbine driven spindles for internal grinding machines ..... Mar. 160
MURRO, Haim—Unusual uses for helical wire springs ..... Dec. 160
NEVIN, Robert S.—Sinusoidal calibration table for vibration type transducer Dec. 172
NIELSEN, L. E.—Better ways of evaluating properties of plastics .... Mar. 130
NOVOTNY, Raymond J.—Fluid flow through orifices ..... Apr. 213
OSTRANDER, C. W.—Chromate protective coatings ..... Sept. 127
OTTMAR, Jerome—Composite metals: a new key to design flexibility .... Nov. 153
PERKINS, R. S.—Extruded plastic parts Oct. 150
PERRY, C. C.—Significance of separation in hydrodynamic design ... July 152
PHILLIPS, Dell—Liquid sensing device with no moving parts ..... June 134
PIPER, R. S.—Engineering uses for rubber adhesives ..... Feb. 130
PORTER, L. Morgan—Critical speeds of end supported, bare shafts ..... July 193
RAMAMOORTHY, C. V.—Resistance wire computing device for solving algebraic equations ..... Feb. 134
RANDICH, E. A.—Bending roll design analysis ..... Jan. 133
RECKNAGEL, F. W.—Nylon parts for ball bearings ..... Feb. 119
ROACH, Arvid E.—Sensitivity of bearing materials to abrasive dirt in oil supply ..... Dec. 155
ROGERS, D. A.—Basic design for small part stampings ..... Jan. 162
RUBINSTEIN, Martin A.—Allowable design loads for aluminum columns Aug. 197
SAMUEL, G. A.—Hard chromium coatings for ferrous parts ..... Aug. 164
SCHACK, William—Status of plastics in industry today ..... Oct. 128
SCHLOSS, Fred—Isolating the noise and vibration of rotating machines .. June 151
SCHMIDT, Philip S.—Current trends in fixed resistors ..... Mar. 124
Current trends in potentiometers Oct. 166
SCHOELLERMAN, A. — Spotwelding highly stressed aluminum and magnesium assemblies ..... Mar. 185
SCHUETTE, E. H.—A critical look at fatigue equations ..... July 150
SCHUMACHER, William C.—More twelve place math ..... Sept. 274
SCOTT, E. H., Jr.—Selecting the right journal bearing material ..... Sept. 119
SHAFTAN, Kenneth—High-Speed photography in design ..... Sept. 167
High-speed camera systems .. Sept. 182A
Correction ..... Nov. 294
SHUM, Aaron H.—Tollerance specification ..... Aug. 284
SMITHSON, Gerald—Converting decimal fractions to actual gear ratios Aug. 158
Correction ..... Oct. 290
SOROKA, Walter W.—Resistance wire computing device for solving algebraic equations ..... Feb. 134
Equivalent dynamical systems for complex vibration problems .... July 130
Fundamental transverse frequencies of tapered cantilever bars ..... Aug. 175
STEWART, H. L.—Multiple pressure hydraulic system ..... Jan. 186
Safety circuits for hydraulic machines ..... Aug. 124
Improve circuit performances with hydraulic accumulators ..... Oct. 192
STRINGHAM, L. K.—Financial incentives for engineers ..... May 202
SUGG, R. E.—Micro-interferometry for surface measurements ..... Aug. 156
SVERDRUP, Nils M.—Fluid flow losses through orifices ..... May 237
SWANSON, E. R.—Traversing mechanisms used on winding machines May 144
TAO, D. C.—Analysis of a symmetrical five-bar linkage ..... Jan. 175
Charts for a five-bar linkage ... Jan. 201
TATARINOV, Victor—Design charts for large compression springs (comment) ..... July 262
Estimating the weights of joints in cylindrical vessels ..... Dec. 213
TEMPLIN, R. L.—Fatigue properties of cast aluminum alloys ..... May 119
TEUSCHER, F. L.—Templets + photography = low cost drawings ..... May 186
THOEN, Richard L.—Fine pitch drawing data (comments) ..... Nov. 278
TUTTLE, W. N.—Adjustable transformer motor speed controls ..... Jan. 178
WALLACE, D.—Flux bath dip brazing of aluminum alloys ..... Feb. 173
WALLACE, J. D.—Engineering reports are vital to good management .. May 220
WATT, J. R.—Selecting metals for low temperature service ..... June 158
WEYDERT, J. C.—Stress charts for pressurized elliptical and oblong tubes ..... June 195
Correction ..... Nov. 286
WHITESIDE, John E.—Complaint against decimal system ..... June 264
Comments ..... Sept. 274
WHITNEY, L. H.—Elastic elongation of chains ..... Feb. 176
WILLIAMS, D. L.—Eleven ways to oil lubricate ball bearings ..... Feb. 166
WINTER, W. T.—Nomograph to simplify gear tooth calculations ... Sept. 205
WISE, Boyd—Putting ultrasonics to work ..... Aug. 180
WORK, Harold K.—Using university facilities for industrial research .. Oct. 185
WRIGHT, D. K. Jr.—Determining rotor inertias by the pendulum method May 233
YORGIADIS, Alex—Streamlining the selection of rectangular wire helical springs ..... June 155

Subscribers can procure extra copies of the 1952 Index by directing requests to The Editor, Product Engineering, 330 West 42nd St., New York 36, N. Y.

The following two pages index articles appearing in the Annual Handbook of Product Design for 1953. These articles are indexed by title—complete subject reference can be obtained by referring to the handbook.

ARTICLE INDEX

ANNUAL HANDBOOK OF PRODUCT DESIGN FOR 1953

SECTION A—GENERAL ENGINEERING

Cost Estimating Principles and Practices by Lawrence E. Doyle ..... A 2
Investigating Friction and Wear With Radioactive Tracers by J. T. Burwell and C. D. Strang .. A 10
Controlling Engineering Design Changes by Allen T. Wilson ..... A 13
Improving Engineering Department Operation by States Mead ..... A 16
New Books ..... A 36

SECTION B—METALS AND ALLOYS

Boron Steels: The Basis of Selection by H. B. Knowlton ..... B 2
The Status of Titanium and Titanium Alloys ..... B 10
Magnesium Casting Alloys Containing Rare Earth Metals by J. C. McDonald ..... B 14
Wrought and Precision Cast Alloys for High Temperature Service by Howard Scott ..... B 16
Metal Refractory Alloys by W. G. Lidman and H. J. Hamjian ..... B 21
Molybdenum—Our Most Promising Refractory Metal by J. J. Harwood ..... B 24
Properties of Chromium Stainless Steels ..... B 30
How to Select the Proper Hardness Scale for Testing Steel by E. F. Bradley ..... B 31
New Books ..... B 64

SECTION C—NON-METALLIC MATERIALS AND FINISHES

Glass Fiber Reinforced Plastics ..... C 2
Organic Finishes for Metal Products ..... C 6
Industrial Porcelain Enamel Coatings by Edward Mackasek ..... C 10
Inorganic Finishes for Metal Products ..... C 12
Foamed Plastics: New Engineering Materials ..... C 16
Impact Properties of Molded Ethyl Cellulose ..... C 18
Properties of 17 Popular Modern Rigid Plastics ..... C 20
Properties of Natural and Synthetic Rubbers ..... C 22
Designer's Guide to the Properties of Neoprene by R. W. Malcolmson ..... C 24
Now: Nylon Parts for Ball Bearings by F. W. Recknagel ..... C 30
Developments to Watch ..... C 33
New Books ..... C 70

SECTION D—FABRICATION AND PRODUCTION PROCESSES

Why and When to Specify Gears Formed by Powder Metallurgy . . . Casting . . . Extrusion . . . Cold Drawing . . . Plastic Molding ..... D 2
Which Surface Hardening Process? ..... D 12
Basic Design for Small Part Stampings by D. A. Rogers ..... D 16
Commercial Tolerances for Die Casting by H. K. Barton ..... D 20
Hot Pressing of Powder Metal Parts by Jerome F. Kuzmick ..... D 22
Sheet Metal Bend Allowance and Correction Charts ..... D 25
New Books ..... D 66

SECTION E—POWER TRANSMISSION

Synthesis of Gearless Differentials by Michael Daniloff ..... E 2
Low Cost Methods of Coupling Small Diameter Shafts ..... E 8
Ten Different Types of Splined Connections by W. W. Heath ..... E 10
How to Select Fluid Couplings ..... E 12
Elastic Elongation of Chains by L. H. Whitney and P. M. MacDonald ..... E 18
Friction Wheel Drives Designed for Maximum Torque by Rudolf Kroener ..... E 20
Precision Measurement of Shaft Speeds by Oliver V. Riley ..... E 23
Selecting the Right Flexible Shaft ..... E 24
Shotpeening as a Factor in the Design of Gears by John C. Straub ..... E 28
Developments to Watch ..... E 31
New Books ..... E 88

SECTION F—DESIGN ANALYSIS AND MECHANICAL PARTS

Predicting Operating Temperatures of High Speed Cylindrical Roller Bearings by E. F. Macks, Z. N. Nemeth and W. J. Anderson ..... F 2
Radial Deflections of Rotating Disks with Constant Thickness and Central Hole by L. M. Porter ..... F 7
Designing for Less Friction by J. M. Eastman ..... F 8
Design of Flat-Wound Tension Springs by R. M. Conklin and D. R. Forry ..... F 14
Gasket Materials and Joint Design by E. C. Frazier ..... F 16
Eleven Ways to Oil Lubricate Ball Bearings by L. L. Williams ..... F 18
Graphical Differentiation . . . Done With a Mirror by J. M. Ramrath ..... F 20
Elastic Rubber Cushion Springs by Robert Iredell ..... F 22
Vibration Nomograph by George F. Forbes ..... F 25
Toggle Linkage Applications in Different Mechanisms by Thomas P. Goodman ..... F 26
Circular Nomogram Theory and Construction Technique by Edward C. Varnum ..... F 28
Dimensional Tolerance Charts for Helical Springs by C. H. Sacks ..... F 31
New Books ..... F 84

SECTION G—FASTENING AND JOINING

Unified Screw Thread System ..... G 2
Properties and Uses of 43 Adhesives Classified According to Chemical Type by N. J. DeLollis ..... G 6
Recommended Design Details to Reduce Corrosion by Fred M. Reinhart ..... G 10
Design Data for Metal Wire Stitching ..... G 12
Silver Brazing of Nickel Alloys ..... G 14
Fastening of Inserts in Molded and Cast Parts ..... G 16
Joining Aluminum by Spot Welding by Coleman Raphael ..... G 18
New Books ..... G 54

SECTION H—MOTORS, ENGINES, AND CONTROLS

How to Select Electric Motors and Motor Controls by Victor J. Kropf ..... H 2
Increasing Tube Reliability in Industrial Circuits by D. G. Koch ..... H 14
Analysis of an Electronic Motor Control System by E. F. Kubler ..... H 18
Operating Characteristics of Servomechanism Drives by W. O. Osbon ..... H 24
New Books ..... H 76

SECTION I—ELECTRICAL AND ELECTRONIC COMPONENTS

Magnetic Amplifier Circuits . . . Operation, Design and Application by Lester W. Buechler ..... I 2
Some Thermocouple Details for Temperature Measurement by Howard W. Cole, Jr ..... I 10
Your Next Switch Selection Problem by A. L. Riche ..... I 12
The Differential Transformer for Control . . . Indication by W. D. MacGeorge ..... I 16
Strain Gage Accelerometers and Pressure Transmitters by G. O. Haglund ..... I 22
Self-Generating Accelerometers by G. K. Guttwein and A. I. Dranetz ..... I 26
Transducer Circuits for Control Applications by T. R. Breunich ..... I 29
Industrial Tristimulus Color Matcher by George P. Bentley ..... I 32
New Books ..... I 90

SECTION J—HYDRAULIC AND PNEUMATIC EQUIPMENT

Air Lubricated Bearings by Paul M. Mueller ..... J 2
Pump Manufacturers' Recommendations for Hydraulic Oils by C. R. Schmidt ..... J 6
Pneumatic Standards for Industrial Equipment ..... J 7
Operating Principles of Some Liquid Flow Meters by Howard W. Cole, Jr ..... J 16
Multiple Pressure Hydraulic Systems by H. L. Stewart ..... J 18
Sequential Operation of Hydraulic Cyclinders by H. L. Stewart ..... J 22
Synchronizing Piston Movement in Hydraulic Cylinders by H. L. Stewart ..... J 24
High Pressure Seals for Process Equipment by Walter Coopey ..... J 26
Flow Rate Conversion Chart by Nils M. Sverdrup ..... J 27
Eight Basic Hydraulic Accumulator Circuit Applications by Edward M. Greer ..... J 28
Lubrication Seals for Rotating Shafts by J. R. Fawcett ..... J 30

Courtesy Lear, Inc.

in instruments where reliability is imperative

SILASTIC* works

where other materials fail

To assure maximum service life and accuracy, engineers at Lear, Incorporated, planned to protect their new vertical gyro-mechanism from corrosion by housing it in a completely inert and dehydrated atmosphere.

Sealing the housing, however, proved to be more easily said than done. Despite the most elaborate precautions, solder and flux fumes often penetrated the joint and contaminated the delicate mechanism. Once sealed, it was impossible to reopen the case without loss of the expensive cover and harness.

To both of these problems a simple and ingenious solution was found. A thin O-ring of Silastic molded to fit snugly under the cover flange is used to exclude the corrosive fumes generated in soldering a metal strip over the entire joint. The Dow Corning silicone rubber O-ring is not damaged by soldering temperatures. And, the gyro-mechanism is just as accessible for repairs as the contents of a hermetically sealed can of coffee.

Lear also uses a large ring washer of Silastic at each end of the housing to serve as resilient, shock-absorbing cushions for the apparatus at stratospheric temperatures.

And that's just one of hundreds of examples of how Silastic is used to improve the performance of products ranging from cable to traction motors, from domestic steam irons to aircraft.

*T. M. Reg. U. S. Pat. Off.

For more information about the properties or fabricators of Silastic, mail this coupon today or phone our nearest branch office.

Dow Corning Corporation, Dept. R-24, Midland, Mich.

Please send me:

- ☐ Silastic Facts 10a with new data on properties and applications of all Silastic stocks and pastes.
- ☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

FIRST IN SILICONES

DOW CORNING SILICONES

MIDLAND, MICHIGAN

Atlanta • Chicago • Cleveland • Dallas • New York • Los Angeles • Washington, D. C. • In Canada: Fiberglas Canada Ltd., Toronto • In England: Midland Silicones Ltd., London